# MODEL 41-3A
# EXPANDED REMOTE CONTROL OPTION
# INSTALLATION AND OPERATION
# SECTION 662-5051-102
# A0041-13-605
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# MODEL 41-3A

# EXPANDED REMOTE CONTROL OPTION

# INSTALLATION AND OPERATION

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## 1. INTRODUCTION

**1.01** This manual contains instructions for installing the Expanded Remote Control (ERC) Option in the basic unit of the Model 41-3A Service Analyzer. Information for operating a Model 41-3A equipped with this remote option (a Model 41-3A w/ERC) is also included.

**1.02** As shown in Table A, the ERC option is one of several products associated with the Model 41-3A. The ERC option is available as a factory-installed feature, or it can be provided as a kit for retrofitting a basic Model 41-3A. Notice that an additional kit, the C-Message Noise & 1-kHz Level Measurement Option, is available as an augmentation to the ERC option.

**1.03** The Model 41-3A is a central office and trunk network routiner with test call and failure analysis capabilities. It is used to measure the quality of telephone networks, and functions as a maintenance or troubleshooting tool. (Instructions for installing and operating the basic Model 41-3A are provided by instruction manual A0041-13-600.)

**TABLE A**

**MODEL 41-3A ASSOCIATED PRODUCTS**

| NED PART NUMBER | DESCRIPTION |
|---|---|
| 0041-13-909 | Model 41-3A basic unit with no options (replaces the old 0041-13-900 basic unit and associated 0041-13-901 MF option) |
| 0041-13-910 | Model 41-3A w/Expanded Remote Control Option (replaces the old 0041-13-905 unit and associated 0041-13-906 MF Option) |
| 0041-13-911 | Expanded Remote Control Option retrofit kit for basic 0041-13-909/900 unit (replaces the old 0041-13-904 remote control retrofit kit) |
| 0041-13-912 | C-Message Noise & 1-kHz Level Measurement Option (operates only when installed with the ERC Option) |
| 5900-00-910/911 | Hazeltine Esprit video terminal (115/230 Volts) with cable |
| 5900-00-920/921 | MFE Model 2500 Cassette Tape Drive (115/230 Volts) with cable and one tape |
| 5900-00-922 | Tape kit consisting of ten cassette tapes |
| *Note:* A hard copy teleprinter suitable for use with the Model 41-3A w/ERC can be purchased from Northeast Electronics. (Contact your Northeast representative for details on current models available.) | |

### A. Purpose of the Expanded Remote Control Option

**1.04** The basic Model 41-3A unit can be programmed via front panel controls for continuous single number dialing. The ERC Option allows multiple call programming of the Model 41-3A under control of a remote/local terminal keyboard or computer device. This option also enables the transmission of test results to a teleprinter or video terminal, or to a remote location via modem. The Model 41-3A w/ERC can interface with a 5900-00-920/921 tape drive, permitting the transfer of call programming and test result data to and from cassette tape.

*Note:* The use of a tape drive other than the 5900-00-920/921 is not recommended.

**1.05** The Model 41-3A w/ERC together with a video terminal (5900-00-910/911), a user-supplied teletypewriter, or an EIA RS-232C compatible printer keyboard enables the user to perform the following:

- Assemble and store a call program containing several telephone numbers with a unique number of test calls assigned for each telephone number
- Execute the call program
- Obtain a display/printout of test call results.

**1.06** When a 5900-00-920/921 tape drive is used, a user can also perform the following:

- Store a call program on tape
- Retrieve a call program from tape
- Store test results on tape
- Retrieve test results stored on tape.

## B. Specifications

**1.07** Specifications for the Expanded Remote Control Option are listed in Table B. Specifications for the basic Model 41-3A are given in manual A0041-13-600.

**TABLE B**

**EXPANDED REMOTE CONTROL OPTION SPECIFICATIONS**

| | |
|---|---|
| COMMUNICATION FORMAT | Full-duplex, serial asynchronous ASCII |
| Baud rate | Selectable 50 to 19200 (factory set at 1200) |
| Character rate | ≤ 120 characters per second (maximum baud rate of 1200) for received data |
| Character bits | 1 start bit<br>7 data bits<br>1 stop bit for baud rates ≥ 134.5<br>2 stop bits for baud rates ≤ 110<br>1 parity bit |
| Parity code | The Model 41-3A ignores the parity bit when receiving information, and sets the parity bit to zero when transmitting. |
| PRODUCT INTERFACE | RS-232-C and 20-mA loop interfaces on a 25-pin, Type D, female connector (designated REMOTE TERMINAL port) |
| Twenty milliamp loop | Must be set for active or passive operation |
| RS-232-C | Female DCE type connector converted to a male DTE type connector via special null modem cable interconnection |
| PROGRAMMING | |
| Call program | Programmable control switch and address instructions |
| Instructions | 256 maximum |
| Addresses | 256 maximum at 32 characters per address instruction |
| Test calls | 1 to 9999 per address |
| Test call results | User selected reports and data transfer |

**TABLE B (Cont)**

| | |
|---|---|
| MEMORY PROTECTION | Internal battery backup for preservation of data stored in RAM memory |
| Battery charge | Requires a minimum 48 hours of continuous unit operation to fully charge battery |
| Minimum protection | 10 hours |
| LEVEL MEASUREMENTS | Requires C-Message Noise & 1-kHz Level Measurement Option (0041-13-912)<br><br>***Note:*** The Model 41-3A applies an internal 735-ohm termination to a call origination line while it is in an off-hook condition. |
| C-Message measurement | Milliwatt signal must be present for a minimum interval of 4000 milliseconds, then absent for minimum interval of 5000 milliseconds |
| Level range | +15 to +55 dBrnC |
| Accuracy | ±1 dB |
| 1-kHz measurement | Milliwatt signal must be present for a minimum interval of 4000 milliseconds |
| Level range | −30 to +10 dBm |
| Accuracy | ±1 dB |
| OPERATING ENVIRONMENT | |
| Temperature | +32 to +122 °F (0 to +50 °C) |
| Humidity | 0 to 90% relative |
| POWER REQUIREMENTS | Supplied by basic Model 41-3A unit |

## C. Service Information

**1.08** Northeast Electronics products are carefully inspected, both mechanically and electrically, before shipment and should be working properly when received. If damaged in transit, notify the transportation carrier immediately.

**1.09** Terms and conditions of sale are contained in the Sales Order Acknowledgment. The warranty for this product can be summarized as follows.

- OEM items are warranted for a period of 90 days.
- Hardware and software items are warranted for a period of one year.

**1.10** It is recommended that Northeast's Repair Department be contacted for assistance if, for any reason, a Northeast product fails to perform as expected. This step eliminates needless delay entailed when a product is unnecessarily returned. Contact the Repair Department at Northern Telecom Inc., Northeast Electronics Division, P.O. Box 649, Concord, New Hampshire 03301, Telephone: (603) 224-6511.

**1.11** If a Northeast Electronics product requires factory service during the warranty period, be sure to include a ship-to address and a description of the problem when returning the product to Northeast Electronics. After the warranty period has expired, equipment returned must be accompanied by all of the following:

- The number of the purchase order covering the cost of servicing
- Bill-to address
- Ship-to address
- Description of problem.

**1.12** In all cases, Northeast Electronics products should be returned directly to our Factory Service Center in Concord, New Hampshire for repair. Any material requiring repair must be returned to Northeast via a Return Material Authorization (RMA) Number which will be assigned by the Service Center Order Processing Administrator. Customers may call the Factory Service Center at 1-603-224-6511, extension 2257 for assignment of this number.

## 2. INSTALLATION

*Note:* Instructions for installing the basic Model 41-3A are provided in manual A0041-13-600.

**2.01** The ERC Option retrofit kit contains the following items:

- Two circuit boards
- One cable assembly with mounting hardware
- A decal placement kit
- A special modem interconnection cable
- One instruction manual (A0041-13-605).

**2.02** The C-Message Noise & 1-kHz Level Measuring Option is also available as an augmentation to the ERC Option. This retrofit kit contains the following components:

- A circuit board
- A paired cable
- A transformer shield with mounting hardware.

### A. Installation of the Expanded Remote Control Option

**2.03** Installing the ERC Option requires the following operations.

(1) Set the Model 41-3A's POWER switch down (off) and remove its input power cord.

(2) Remove the 41-3A's top cover by removing the rear corner screw on each side of the unit. This step allows access to the card cage of the 41-3A as shown in Figure 1.

(3) Remove the memory board in card slot 10 of the 41-3A and replace it with the new memory board provided in the retrofit kit.

(4) The retrofit kit also provides a TTY interface board and cable assembly, both of which must be installed in the 41-3A unit. If the unit being retrofitted is an older 0041-13-900 type Model 41-3A, it may presently contain an interface board and cable assembly — both of which must be removed prior to installing the new TTY components as detailed in steps 5 thru 15.

(5) Locate switch assembly S1 in the upper left portion of the new TTY interface board. Refer to Figure 2 and set S1 in accordance with the terminal device to be used with the Model 41-3A.

*Note:* All products used for a system configuration must be set at the same baud rate.

(6) If a teletype printer is to be used, the TTY interface board must also be strapped for either passive or active operation of the 20-mA printer loop. This operation is described in steps 7, 8, and 9. If an RS-232-C compatible printer is to be used, skip directly to step 10.

(7) Locate three jumper straps at the top center of the board (see Figure 2 for the designated A, B, C, C', X, Y, and Z strapping posts).

(8) If the teletype has a built-in current source to drive its printer, strap the TTY interface board for passive operation as follows:

- A to Y
- B to Z
- C to C'.

(9) If the teletype does not have a built-in current source, strap the TTY interface board for active operation as follows:

- A to X
- B to Y
- C to Z.

(10) From the retrofit kit, remove the cable assembly with a 25-pin connector at one end and a smaller connector at the other end.

(11) Face the rear of the Model 41-3A and remove the REMOTE TERMINAL cover plate. (Two nuts secure the plate.)

(12) From inside the Model 41-3A, pass the 25-pin connector through the rear slot marked REMOTE TERMINAL. As shown in Figure 1, position the flange of the connector against the outside surface of the rear panel. Use the standoffs, nuts, and washers provided in the kit to secure the connector to the rear panel. Insert the standoffs from outside the rear panel, and attach washers and nuts from inside.

(13) The plug at the other end of the cable attaches to the jack at the top of the TTY interface board. Insure that pin 1 of the jack is aligned with the red dot on the plug.

(14) Install the TTY interface board in card slot 11 — face the component side of this board away from card slot 10.

(15) If the C-Message Noise & 1-kHz Level Measuring Option is to be included as part of the ERC Option, proceed directly to part B (Installation of C-Message Noise & 1-kHz Level Measuring Option). Otherwise, replace the top cover of the 41-3A.

(16) Locate the decal kit and follow the instructions of Part No. A0041-13-608 for the proper placement of rear panel decals.

(17) Re-connect the unit's input power cord.

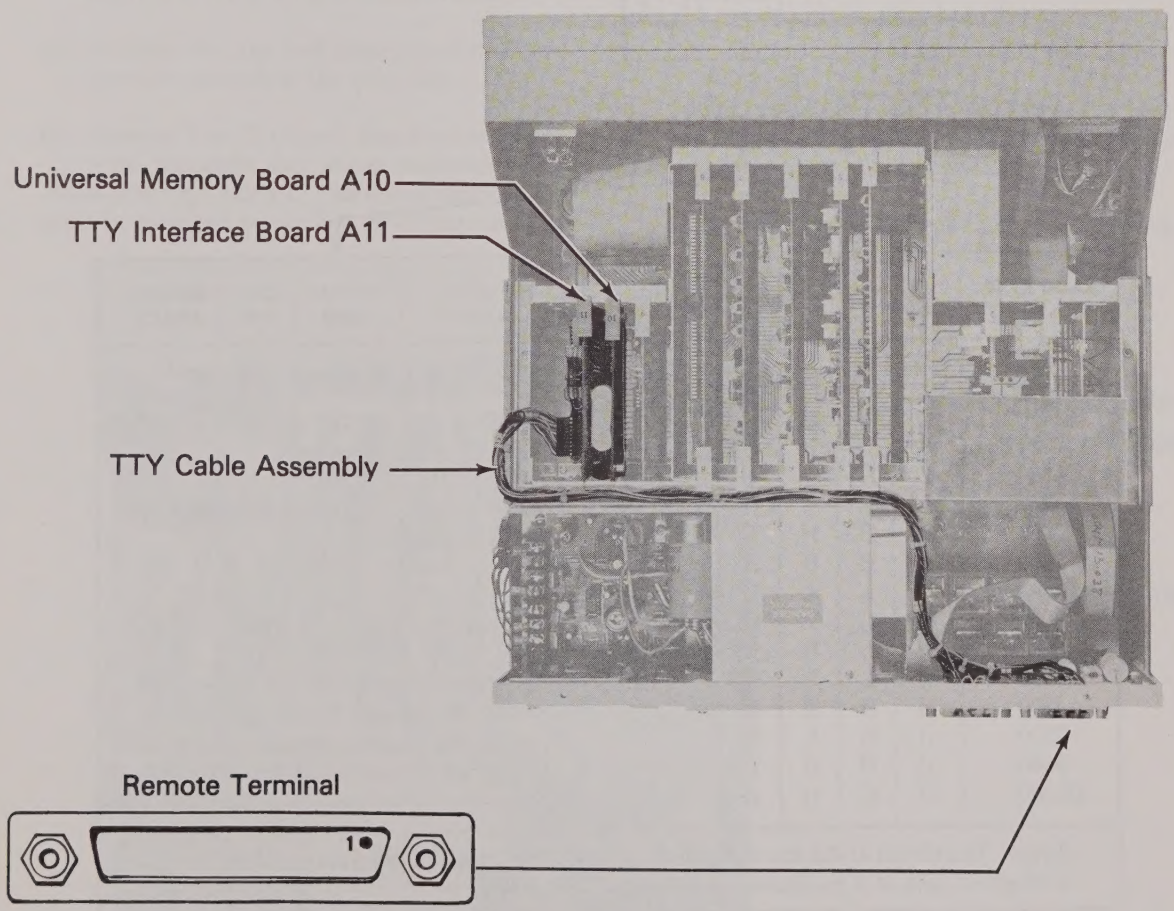
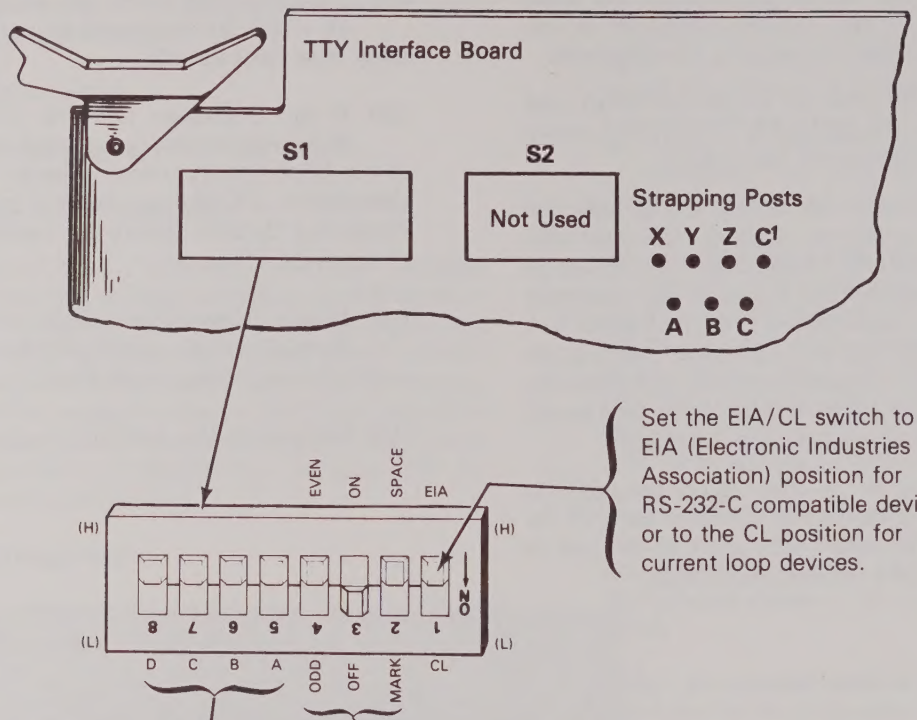



**Fig. 1—Installation of ERC Option**




| BAUD RATE (See Note) | D | C | B | A |
|---|---|---|---|---|
| 50 | L | L | L | L |
| 75 | L | L | L | H |
| 110 | L | L | H | L |
| 134.5 | L | L | H | H |
| 150 | L | H | L | L |
| 300 | L | H | L | H |
| 600 | L | H | H | L |
| 1200 | L | H | H | H |
| 1800 | H | L | L | L |
| 2000 | H | L | L | H |
| 2400 | H | L | H | L |
| 3600 | H | L | H | H |
| 4800 | H | H | L | L |
| 7200 | H | H | L | H |
| 9600 | H | H | H | L |
| 19,200 | H | H | H | H |

| PARITY CODE | EVEN/ ODD | ON/ OFF | MARK/ SPACE |
|---|---|---|---|
| EVEN | EVEN | ON | X |
| ODD | ODD | ON | X |
| PARITY BIT ALWAYS MARK (1) | (either) | OFF | MARK |
| PARITY BIT ALWAYS SPACE (0) | (either) | OFF | SPACE |

***Note:*** The Model 41-3A ignores the parity bit when receiving, and sets the parity bit to 0 when transmitting.

***Note:*** The Model 41-3A transmits data over the full range of baud rates given; however, it receives data at a maximum baud rate of 1200 baud.

A02806-00

**Fig. 2—TTY Switch S1 and Strapping Posts**

## B. Installation of C-Message Noise & 1-kHz Level Measuring Option

**2.04** Installing the C-message noise & 1-kHz level measuring option requires the following operations.

(1) Locate the C-message board from the retrofit kit and install it in card slot 12 — face the component side of this board away from card slot 11.

*Note:* Temporarily disconnect the TTY cable plug from the jack at the top of the TTY interface board to allow insertion of the C-message board. Insure that pin 1 of the jack is aligned with the red dot on the plug when the TTY cable is re-connected.

(2) Remove the card cage shield shown in Figure 3. (Three nuts secure the shield.)

(3) Remove the Line Switching Interface Board from the 1st slot of the card cage.

(4) Remove the U-shaped transformer shield (with standoffs and other hardware) provided in the retrofit kit. This transformer shield must be mounted on the line switching interface board as shown in Figure 4. Ensure that the two holes are positioned such that the standoffs and shield do not make contact with other components.

(5) Replace the switching interface board in the card cage, and assemble the card cage shield previously removed in step 3.

(6) Replace the top cover of the 41-3A and remove its bottom cover to expose the non-component side of the Mother Board as shown in Figure 5.

(7) Figure 5 details the installation required of the shielded cable supplied in the C-message noise & 1-kHz level measuring kit. Use one lead of the cable to connect pin 22 of socket XA12 to pin 7 of XA2. The other lead connects pin Z of XA12 to the ground bus which connects to pin Z of XA1.

(8) Replace the bottom cover of the 41-3A.

(9) Locate the decal kit and follow the instructions of Part No. A0041-13-608 for the proper placement of rear panel decals.

(10) Re-connect the unit's input power cord.

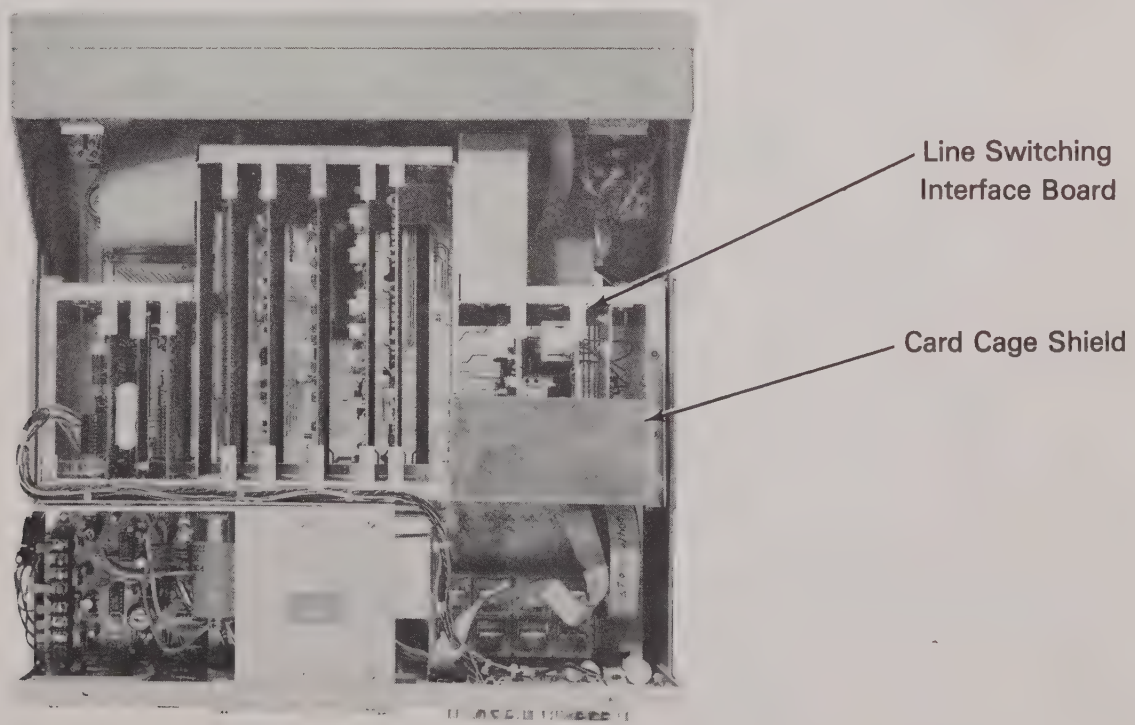
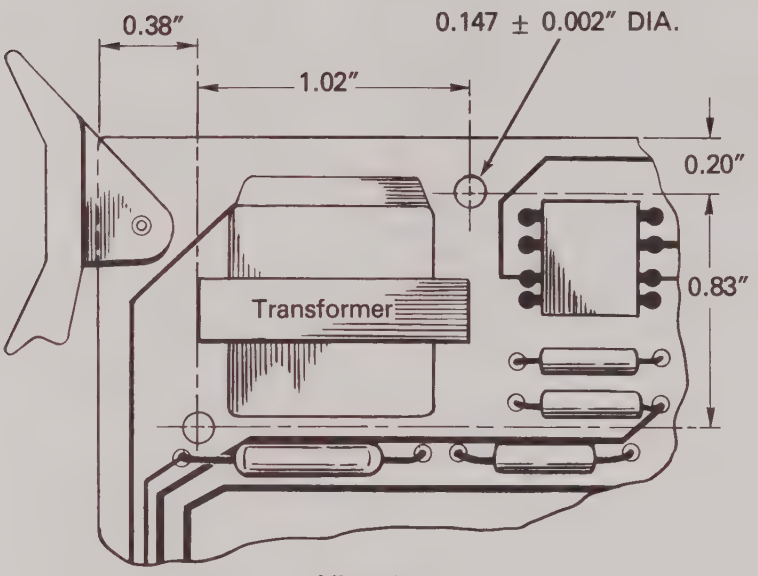
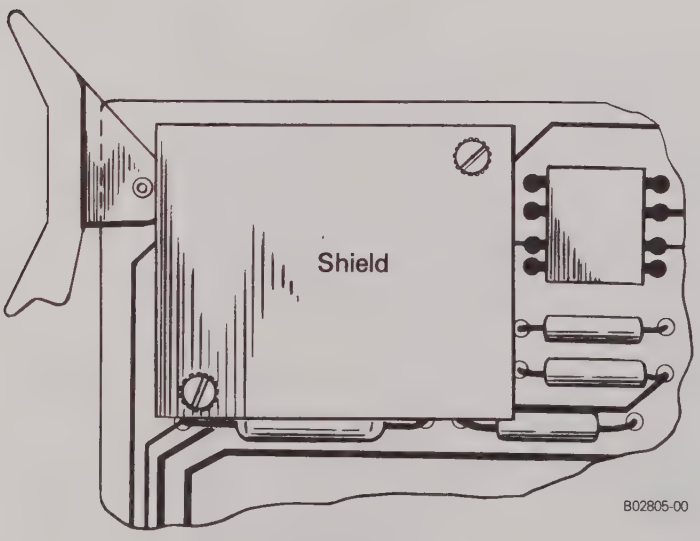



**Fig. 3—Card Cage Shield**

Line Switching Interface Board

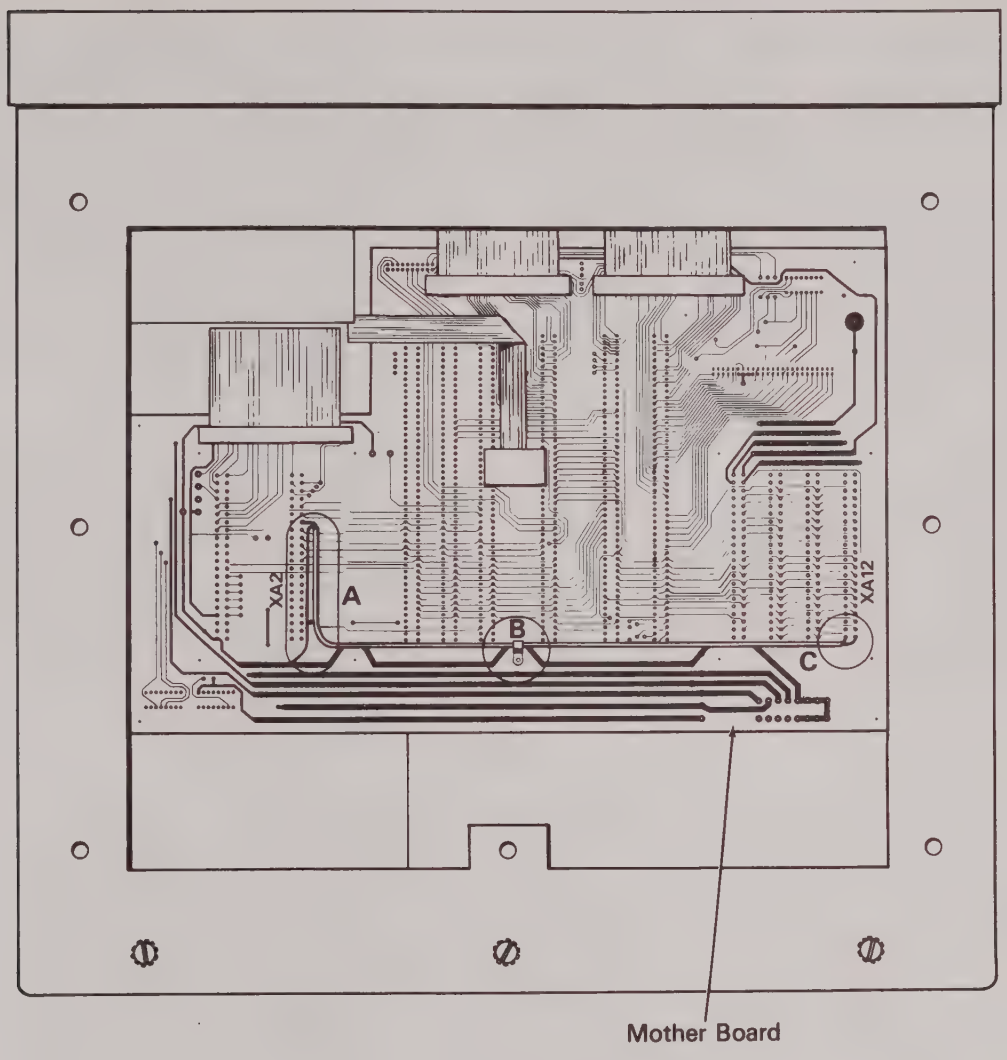


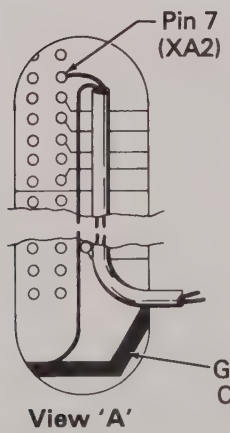

View 'A'

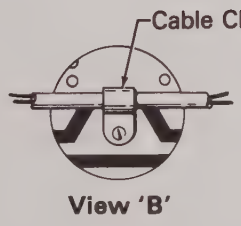


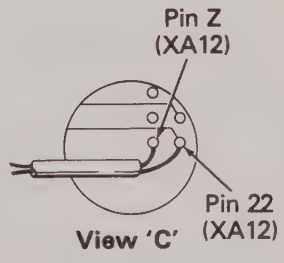

View 'B'

Fig. 4—Transformer Shield




Notes:

1. Connect pin 22 (XA12) to pin 7 (XA2).
2. Connect pin Z (XA12) to the ground bus.

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**Fig. 5—Paired Cable**

## C. External Cable Connections

**2.05** Manual A0041-13-604/600 provides instructions needed for power and telephone line connections to the Model 41-3A. External cable connections to the REMOTE TERMINAL jack are also required when the 41-3A unit is not operated directly from its own front-panel controls. The Model 41-3A w/ERC may be operated from a terminal keyboard or computer device via (a) a modem interface, or (b) via a local cable connection. Therefore, the user's equipment configuration determines the type of cable connection to the REMOTE TERMINAL jack.

**2.06** Table C below lists the port characteristics of the Model 41-3A w/ERC and associated Northeast Electronics products. Table D provides pin identification for the REMOTE TERMINAL connector. Notice that the REMOTE TERMINAL port presents a 20-mA current loop interface and an RS-232-C interface on a DCE (data communications equipment) type female connector. For either interface, an asynchronous serial ASCII format is required.

**2.07** The special null modem interconnection cable shown in Figure 6 is provided in the ERC Option kit. Notice that the null modem cable does not connect pin-for-pin; instead, pins 2 and 3 of this cable are cross-connected. When mated with the REMOTE TERMINAL jack, the null modem cable converts the jack's DCE interface to a data terminal equipment (DTE) interface. The null modem cable can also function as a DTE-to-DCE interface converter; therefore, it is available as an interface cable for both DCE-to-DCE and DTE-to-DTE type situations. Figure 7 illustrates a typical application of the null modem cable as a DCE-to-DCE interface.

**2.08** The null modem cable is designated as Cable 1. Other RS-232-C cable assemblies are available when user equipment includes a 5900-00-910/911 video terminal and a 5900-00-920/921 cassette tape drive. The video terminal is supplied with a male-to-male cable (Cable 2), and the tape drive is supplied with a male-to-female cable (Cable 3). Cables 2 and 3 both function as DCE-to-DTE connectors as shown in Figures 8 and 9.

**TABLE C**

**NED PRODUCT INTERFACES**

| PRODUCT | JACK | SEX | DCE/DTE |
|---|---|---|---|
| Model 41-3A w/ERC | REMOTE TERMINAL | female | DCE |
| Video Terminal (5900-00-910/911) | EIA/C.L. | female | DTE |
| Cassette Tape Drive (5900-00-920/921) | MODEM | male | DTE |
| | TERMINAL | female | DCE |

## TABLE D

## REMOTE TERMINAL PIN IDENTIFICATION

| PIN | 41-3A FUNCTION | RS-232-C SIGNAL NAME |
|---|---|---|
| 1 | ground | Protective Ground |
| 2 | input port | Transmitted Data |
| 3 | output port | Received Data |
| 4 | input (ignored) | Request To Send (RTS) |
| 5 | +12 V output (470 ohms) | Clear To Send (CTS) |
| 6 | +12 V output (470 ohms) | Data Set Ready (DSR) |
| 7 | ground | Signal Ground (common return) |
| 8 | +12 V output (470 ohms) | Received Line Signal Detector |
| 20 | input (ignored) | Data Terminal Ready (DTR) |
| 11 | + input | 20 mA LOOP |
| 13 | – input | |
| 14 | + output | |
| 16 | – output | |

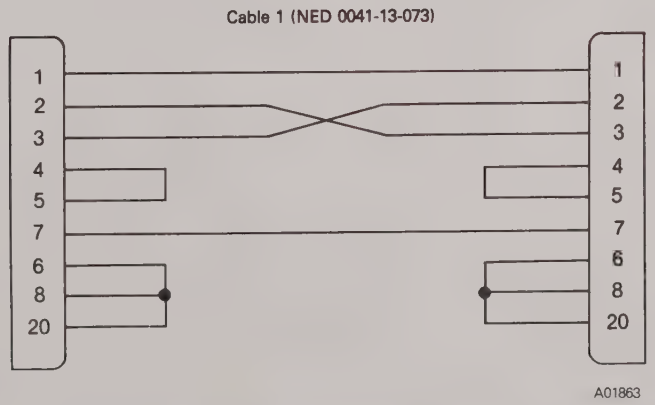



**Fig. 6—Null Modem Cable**

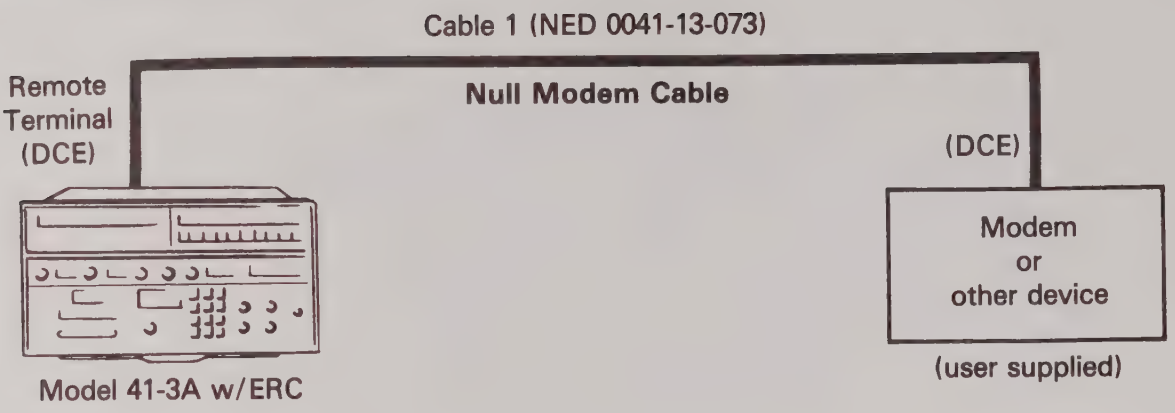



**Fig. 7—Typical Null Modem Cable Connection**

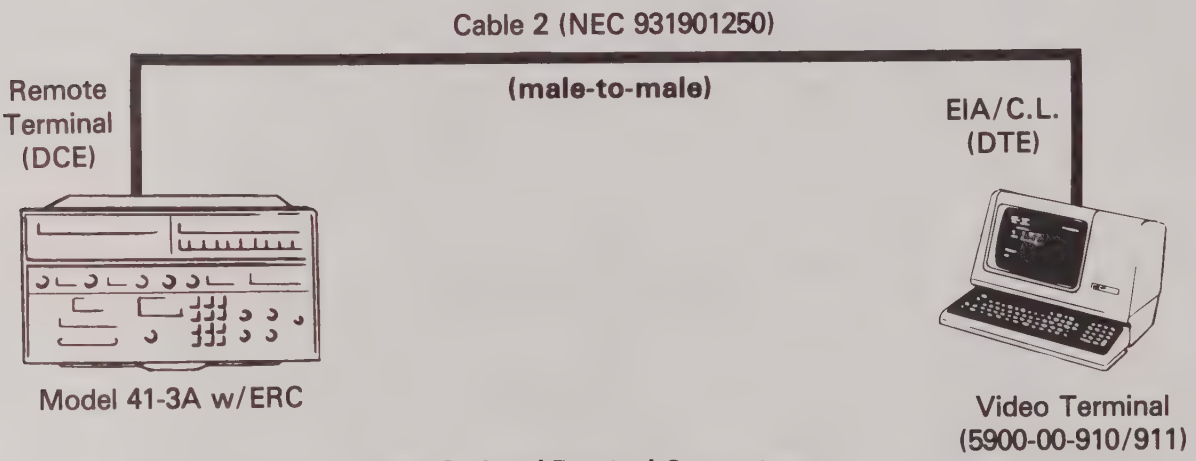



**Fig. 8—Local Terminal Connection**

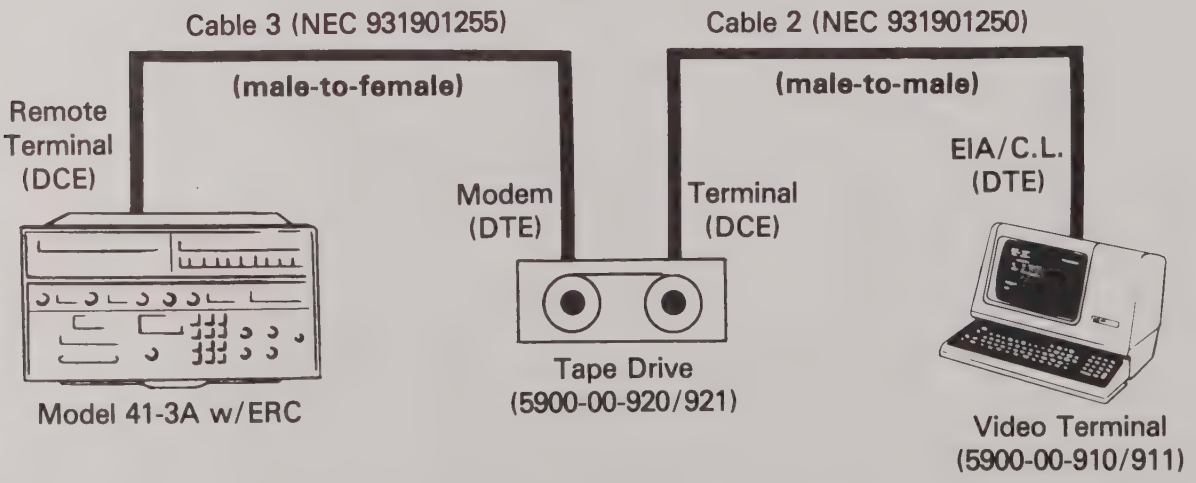



**Fig. 9—Local Terminal and Tape Drive Connections**

A02806-01

## D. Equipment Control Requirements

### 2.09 Baud Rates

**2.10** All products used in a 41-3A system configuration must operate at the same baud rate. The baud rate of the Model 41-3A w/ERC is factory set at 1200 baud. Refer to Figure 2 when resetting the baud rate switch on the TTY Interface Board.

*Note:* Always remove the Model 41-3A's input power cord before removing its top cover or removing circuit boards from its card cage.

**2.11** The 5900-00-910/911 terminal has bit switches mounted on its rear panel for selecting baud rate. Set-up switches (DYS-10 and DYS-8) are factory preset as shown by Figure 10 below.

**2.12** The baud rate selector for the 5900-00-920/921 tape drive is found on its front panel.

*Note:* The NED 5900-00-920/921 tape drive (or equivalent) is the only cassette tape drive unit recommended for use with the Model 41-3A w/ERC.

**2.13** After all product baud rates are adjusted, cycle power at the terminal.

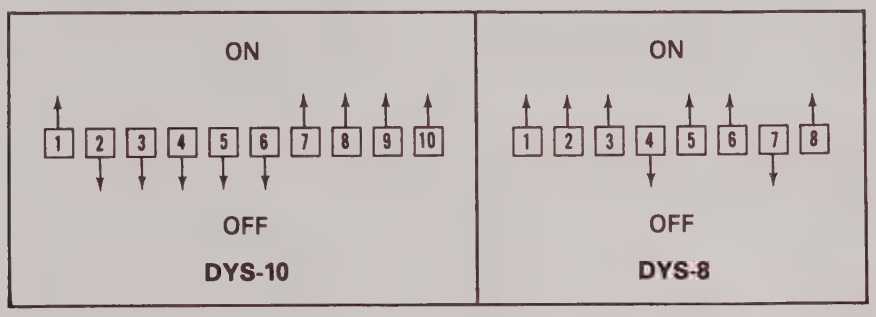



**Fig. 10—Switch Positions for Terminal 5900-00-910/911**

### 2.14 Model 41-3A Controls

**2.15** The remote control option enables an operator to store a program of instructions within the Model 41-3A's internal memory. The stored program usually contains control instructions which override many of the Model 41-3A's front panel switch settings. However, there are certain control functions which remain independent of the remote control option programming. In addition to the POWER switch, the following designated potentiometers and thumbwheels must be preset in accordance with manual A0041-13-606/600 (Model 41-3A Central Office Service Analyzer) and the user's application.

- SYSTEM TIMING & MON: NETWORK DLY, TEST OK TIME, RECYCLE PERIOD, DIALING/MASTER VOLUME
- START DIAL COMMAND: START AFTER, FAULT AFTER
- DIALER PROGRAM: SPEED, % BRK, IDT (DP)
- LOOP/LEAK: (inner and outer knobs).

*Note:* To ensure a correct test response, set the NETWORK DLY time at approximately 15 seconds for 1-kHz tone or C-message noise measurements.

**2.16** Unless otherwise directed by a stored instruction, the Model 41-3A defaults to its panel control settings. A program error may then halt a dialing operation if the following panel switch conditions are not observed:

- one or both START DIAL COMMAND pushbuttons (DELAY or DIAL TONE) must be depressed
- one or more TEST OK ON pushbuttons (1KHZ TONE, ANS SUP, or INC CKT) must be depressed
- one or more LINE CONTROL TEST pushbuttons (TEST A or TEST B) must be depressed.

### 2.17 Terminal Equipment Controls

**2.18** When user equipment includes a 5900-00-910/911 video terminal the CAPS LOCK key of its keyboard must be latched on.

**2.19** When a 5900-00-920/921 tape drive is used, the ON LINE switch (as well as the power switch) of the tape drive must be on (up position); the remaining front panel switches must be off.

## 3. OPERATION

**3.01** The ERC Option enables the Model 41-3A to be operated under control of a remote/local terminal keyboard or host computer (micro, mini, etc.).

**3.02** After the Model 41-3A is powered up (or its ac power is returned following an interruption), it transmits a SYSTEM RESET message. As shown below in Figure 11, the Model 41-3A must then be placed in its system ready mode to allow use of its other functional modes. (The system ready mode also permits the Model 41-3A to be operated directly from its own panel controls.)

> ***Note:*** Spurious noise at power-up may prevent a system reset condition. If so, check that the tape drive (if used) is turned on, repower the terminal and then the Model 41-3A.

**3.03** A keyboard programming exercise is presented first to quickly familiarize an operator with the Model 41-3A's internal control structure. Following this programming exercise, each control mode shown in Figure 11 is discussed in detail under an appropriate subject heading (System Reset, System Ready, etc.). Protocol requirements for control of the Model 41-3A via a host computer device are discussed last.

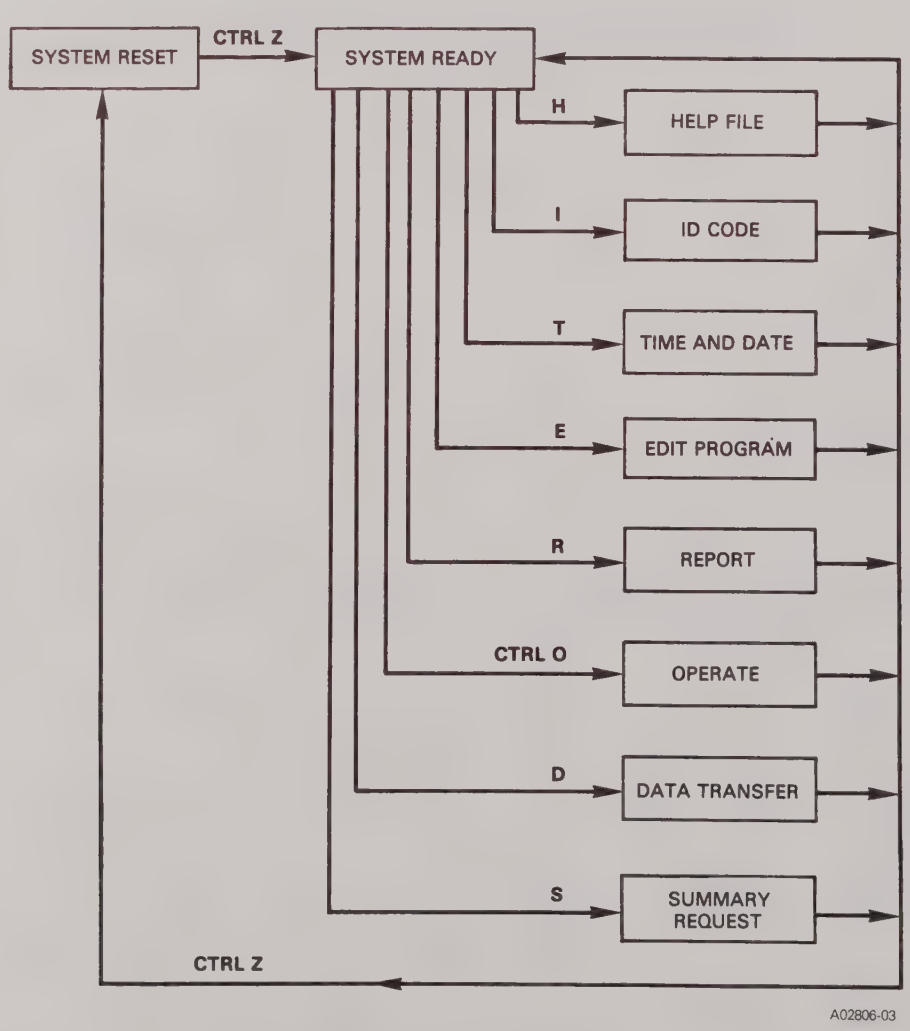



**Fig. 11—Control Modes**

## A. Programming Exercise

**3.04** After the POWER switch of the Model 41-3A w/ERC is turned on and its POWER INTERRUPT indicator begins flashing, an initial system reset message is sent to the terminal. Step 1 of the programming exercise begins after the initial reset indication shown below in Figure 12.

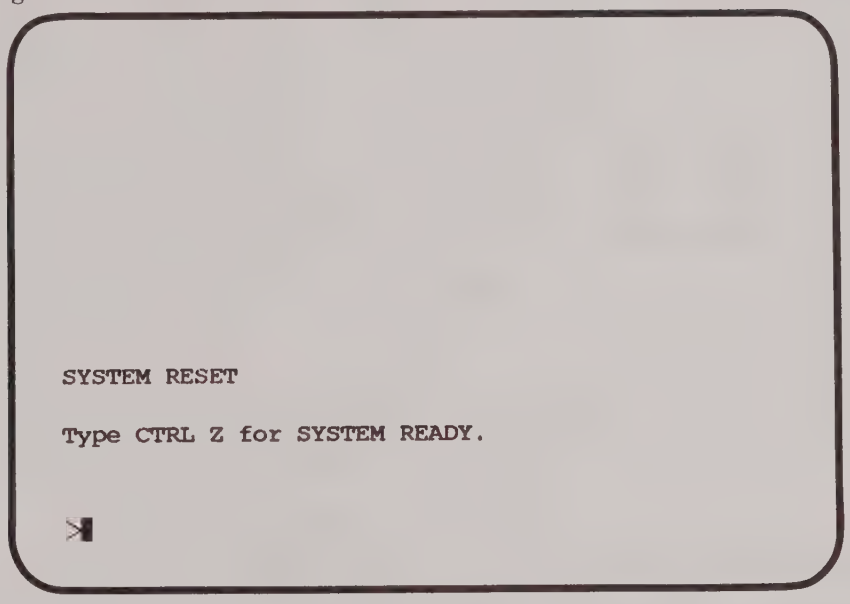



**Fig. 12—System Reset**

*Note:* The assigned functions of the CTRL and other special keys are tabulated below (Table E) for quick reference.

**TABLE E**

**SPECIAL KEYBOARD FUNCTIONS**

| KEY | FUNCTION |
|---|---|
| CAPS LOCK (UPPERCASE) | Must be locked down at all times for proper uppercase alphabetic commands |
| CTRL | Used in conjunction with designated letter keys, e.g., CTRL Z, CTRL E, CTRL O, etc. (CTRL key is held depressed and then the letter key is pressed) |
| SHIFT | Used when assigning a positive (+) sign to parameter values |
| RETURN | Referred to as a <RET> entry (used for several command functions) |
| SPACE BAR | Referred to as a <SB> entry when necessary to distinguish it from other designated keys (it serves the same function as the space bar/key on a standard typewriter) |
| DELETE (or RUB OUT) | Referred to as a <DELETE> entry (used as an editing function) |

Step 1. As instructed in Figure 12, a CTRL Z command is required to place the 41-3A system in a ready status. ***Hold down the CONTROL key, then press the Z key. Compare your terminal display to Figure 13.***

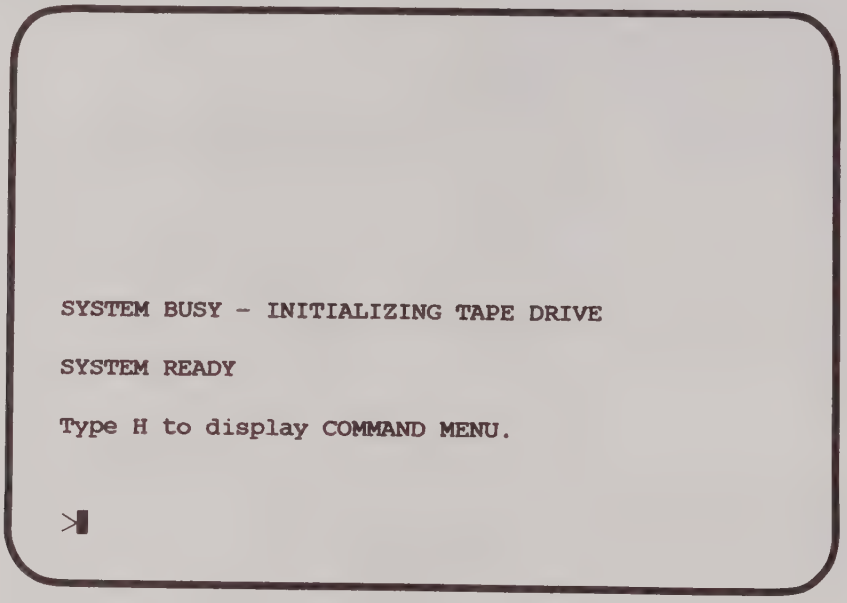



**Fig. 13—System Ready**

***Note:*** A system-busy message may precede a ready notification.

Step 2. As instructed in Figure 13, an H (help) command is used to obtain a list of commands (Figure 14) needed to operate the Model 41-3A. ***Press the H key.***

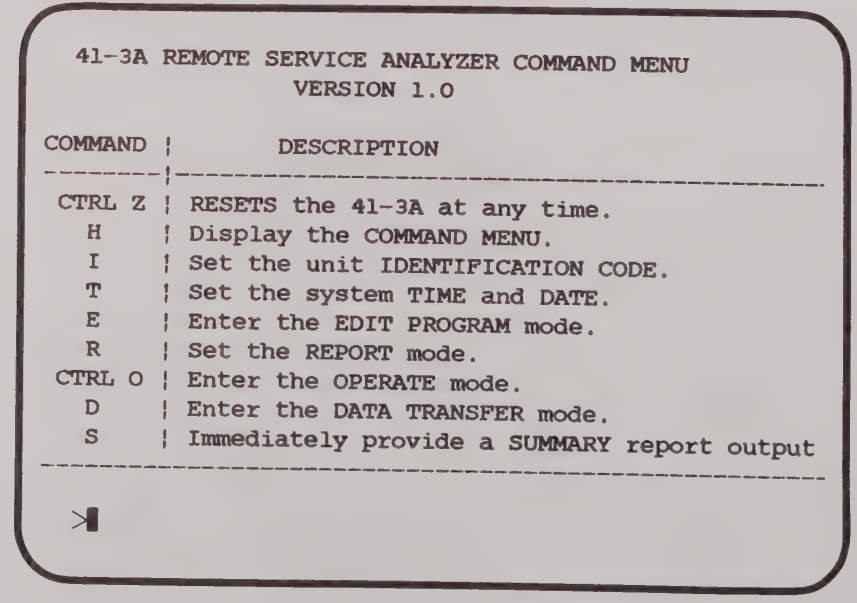

41-3A REMOTE SERVICE ANALYZER COMMAND MENU
VERSION 1.0
COMMAND | DESCRIPTION
CTRL Z | RESETS the 41-3A at any time.
H | Display the COMMAND MENU.
I | Set the unit IDENTIFICATION CODE.
T | Set the system TIME and DATE.
E | Enter the EDIT PROGRAM mode.
R | Set the REPORT mode.
CTRL O | Enter the OPERATE mode.
D | Enter the DATA TRANSFER mode.
S | Immediately provide a SUMMARY report output
>

**Fig. 14—Model 41-3A Command Menu**

Step 3. Steps 3 and 4 use the ID mode to program an identification code for this programming exercise. ***Press the I key.***

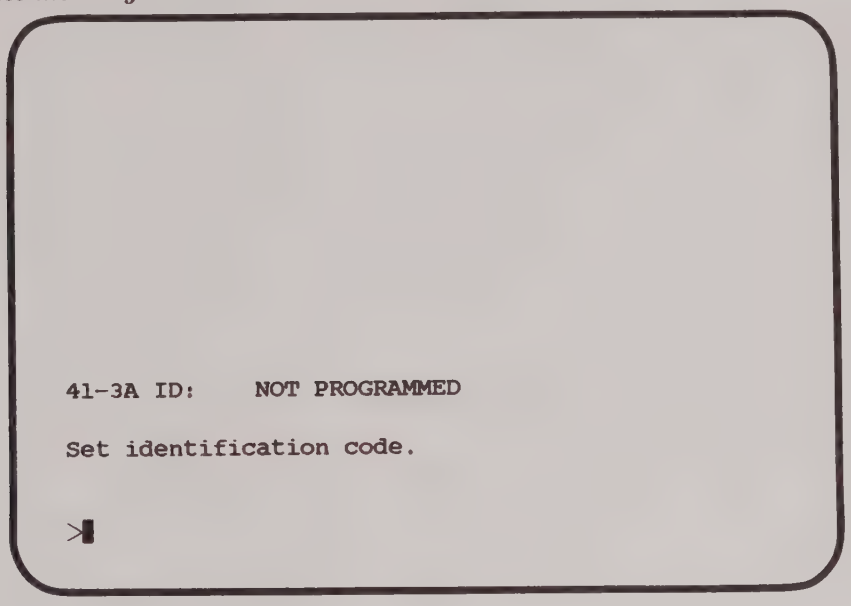



**Fig. 15—ID Code Mode**

Step 4. The NOT PROGRAMMED indication in Figure 15 appears when an ID code has not been assigned; otherwise, the code previously programmed is shown. In either case, ***type EXERCISE 1, then press the RETURN key.***

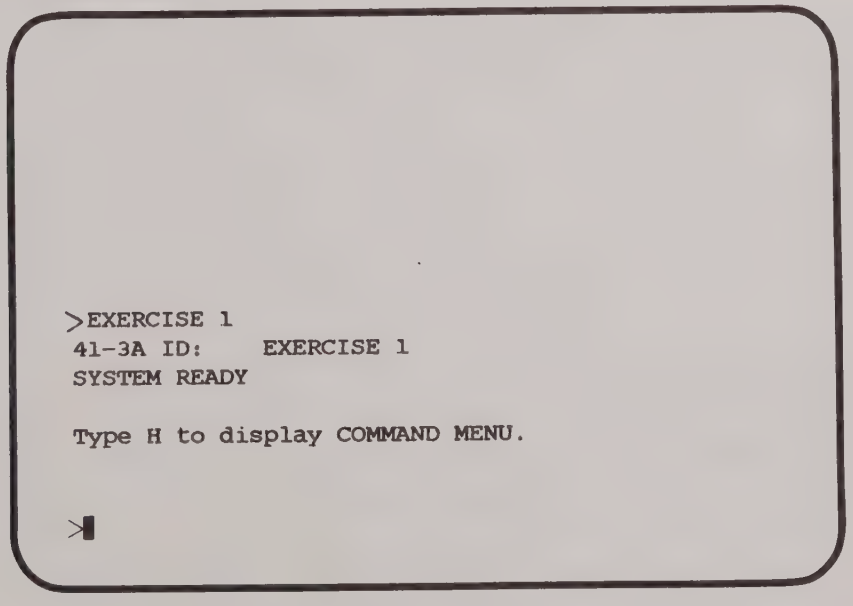



**Fig. 16—ID Code Verification**

***Note:*** The RETURN key entry is designated as a <RET> command.

Step 5. Steps 5 and 6 use the time and date mode to initialize a 24-hour clock in the Model 41-3A. ***Press key T.***

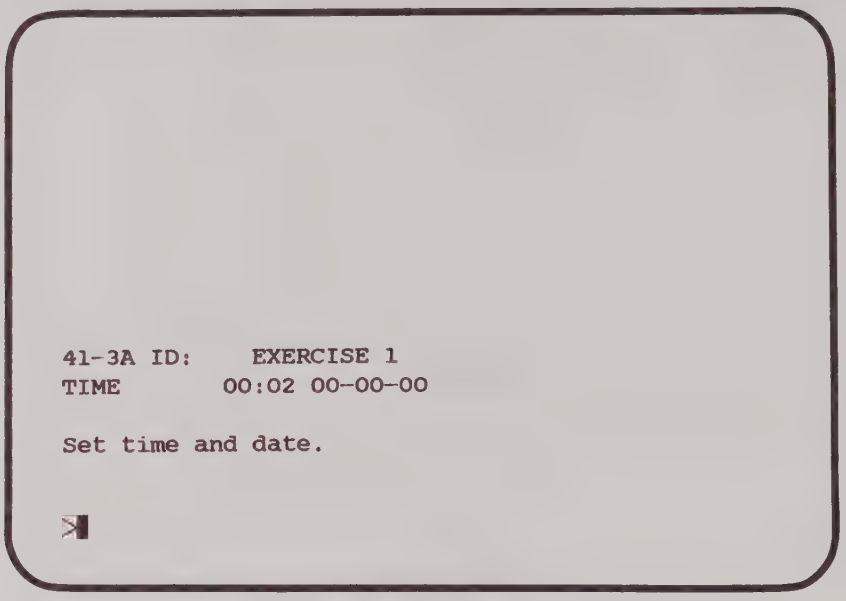



**Fig. 17—Set Time and Date Mode**

***Note:*** Assuming 2 minutes have elapsed since power-up of the Model 41-3A, a time indication of 00.02 is given in Figure 17.

Step 6. The entry format is hour, minute, month, day, and year. The digit sequence 0918072884, for example, initializes time at 9:18 AM and the date at July 28, 1984. ***Type 0918072884.***

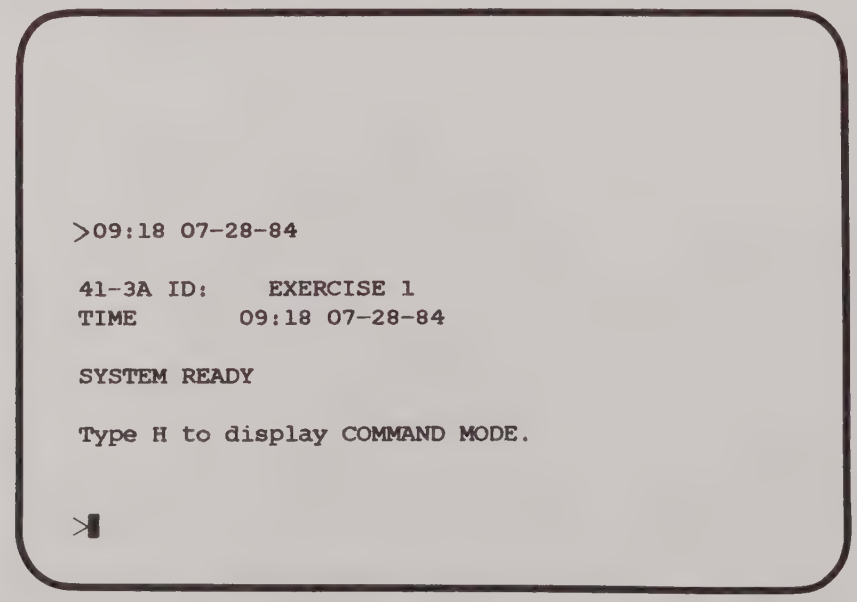



**Fig. 18—Time and Date Verification**

Step 7. Steps 7 thru 16 use the edit mode to assemble and store a call program in the Model 41-3A. ***Press key E.***

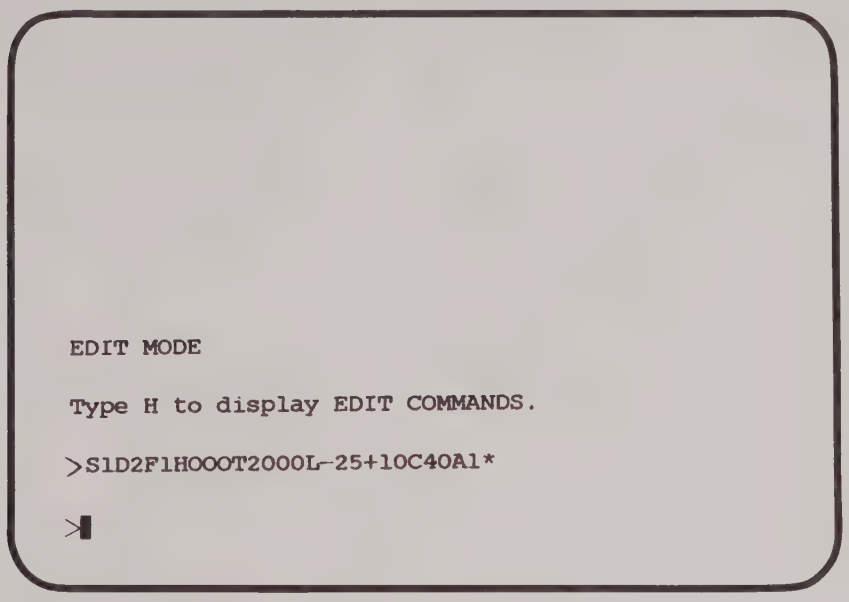



**Fig. 19—Edit Mode**

Step 8. The example display used for Figure 19 shows a previously stored instruction (S1D2F1HOOOT2000L−25+10C40A1*). This instruction (and other instructions which may have been stored after it) can be removed. ***Enter a CTRL C command.***

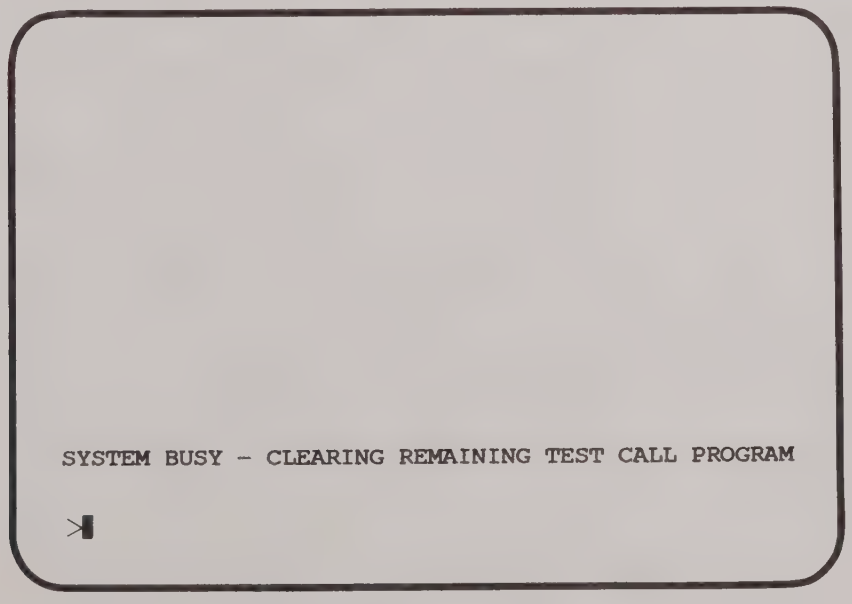



**Fig. 20—Edit Mode Clearing Message**

Step 9. The CTRL C command is only one of several edit mode commands. A list of other editing commands is available. ***Press the H key.***

```
EDIT COMMAND MENU

COMMAND    |   DESCRIPTION
-----------|-------------------------------------------------------------
   S       | Enter the SWITCH/CONTROL mode.
   F       | Display SWITCH/CONTROL format.
 S<RET>    | Clear the current entry.
           |
   N       | Enter the EDIT ADDRESS mode.
   A       | Display ADDRESS format.
 DELETE    | Delete the last address digit.
 N<RET>    | Clear current entry.
           |
 CTRL U    | Abort edit of current entry.
 CTRL C    | Clear the remaining test call program.
CTRL F###  | Move forward ### lines  (# = 0 to 9, CTRLF, CTRLU or <RET>).
CTRL B###  | Move backward ### lines (# = 0 to 9, CTRLB, CTRLU or <RET>).
           |
 CTRL E    | Exit EDIT mode.
-------------------------------------------------------------------------

>
```

**Fig. 21—Edit Command Menu**

Step 10. The first example instruction to be assembled and stored is a switch control instruction. To display the switch control format, ***press key F.***

```
>  FORMAT       FUNCTION              SELECTION
I-------------------------------------------------------------------------I
I S#           START DIAL   1 = DELAY   2 = DIAL TONE       3 = BOTH      I
I-------------------------------------------------------------------------I
I D#            DIAL TYPE   1 = DP      2 = TT   4 = MF                    I
I-------------------------------------------------------------------------I
I F#            FAULT ON    0 = NONE    1 = C    2 = REV    3 = BOTH      I
I-------------------------------------------------------------------------I
I H####          HOLD ON    0 = NO      1 = REORDER        2 = BUSY      I
I                           4 = REORDER or BUSY and ANSWER  8 = FAULT     I
I-------------------------------------------------------------------------I
I T####        TEST OK ON   1 = ANSWER                  2 = 1-KHZ LEVEL   I
I                           4 = INC CIRCUIT             8 = C-MESSAGE NOISE I
I-------------------------------------------------------------------------I
I L######   1-KHZ WINDOW            RANGE = -30 to +10 dBm                 I
I-------------------------------------------------------------------------I
I C##     C-MESSAGE LEVEL           RANGE = 15 to 55 dBrnC                 I
I-------------------------------------------------------------------------I
I AB          LINE SELECT       ALL LINES =   <RET> or AB<RET>            I
I                             ONE CHANNEL =  A<RET> or  B<RET>            I
I                             SINGLE LINE = A#<RET> or B#<RET>            I
I-------------------------------------------------------------------------I

>
```

**Fig. 22—Switch Control Format**

Step 11. The instruction to be programmed (Figure 23) contains dial tone, DP, no fault, no hold, and 1-kHz tone selections. ***First, press key S.Then type digit sequence 210 for the S#, D#, and F# functions. Type 0000 for the H#### and 2000 for the T#### functions. Type −30 and +10 (use SHIFT key for + sign) to select the full dBm level range. Finally, enter a <RET> to select all lines and store the instruction.***

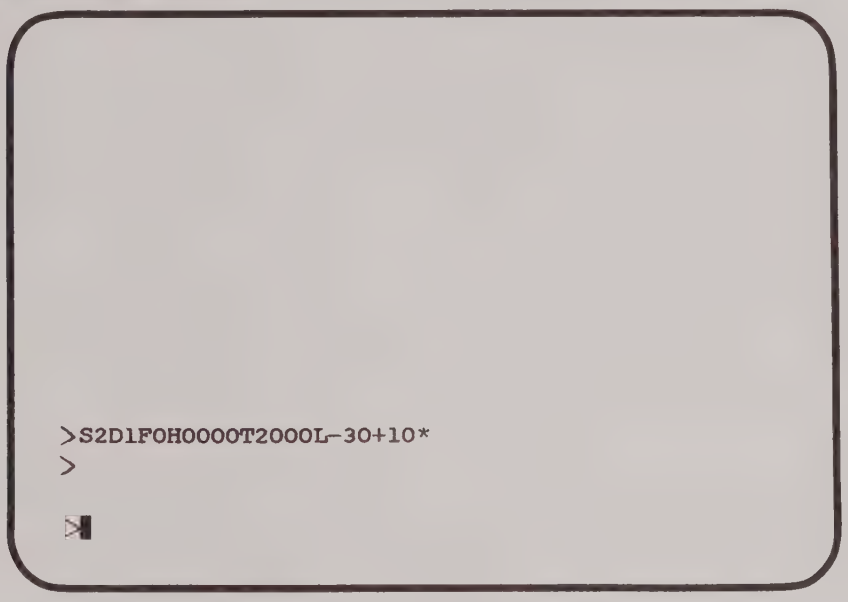



**Fig. 23—Switch Control Instruction**

Step 12. The next instruction to be assembled and stored is an address instruction. To obtain the entry format, ***type A.***

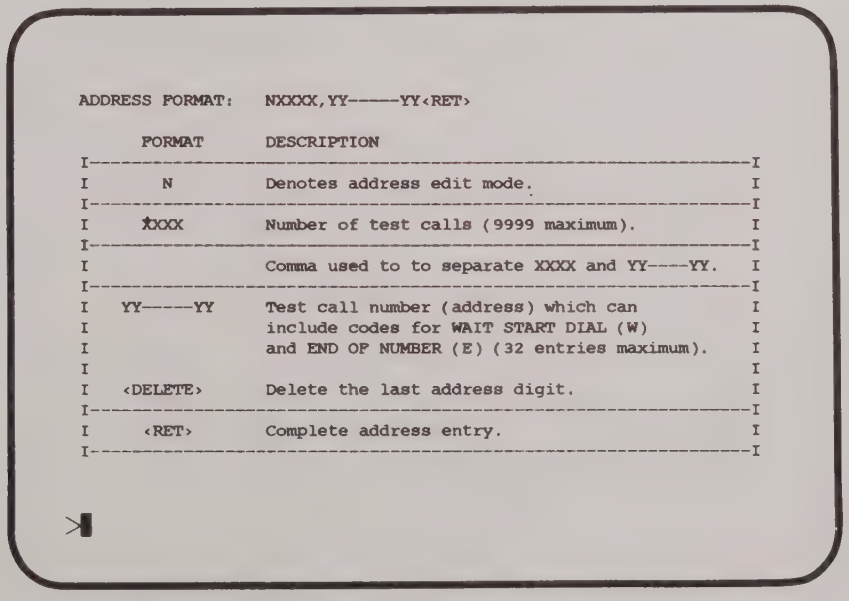

ADDRESS FORMAT: NXXXX,YY-----YY<RET>
FORMAT DESCRIPTION
N Denotes address edit mode.
XXXX Number of test calls (9999 maximum).
Comma used to to separate XXXX and YY----YY.
YY-----YY Test call number (address) which can include codes for WAIT START DIAL (W) and END OF NUMBER (E) (32 entries maximum).
<DELETE> Delete the last address digit.
<RET> Complete address entry.

**Fig. 24—Address Format**

Step 13. The address instruction (Figure 25) to be assembled and stored programs the Model 41-3A to dial 4 test calls to telephone number 224-6511. ***Type N4 to designate the address mode and the number of test calls. Separate this entry with a comma (,) and then type 2246511. Enter a*** <RET> to store this instruction.

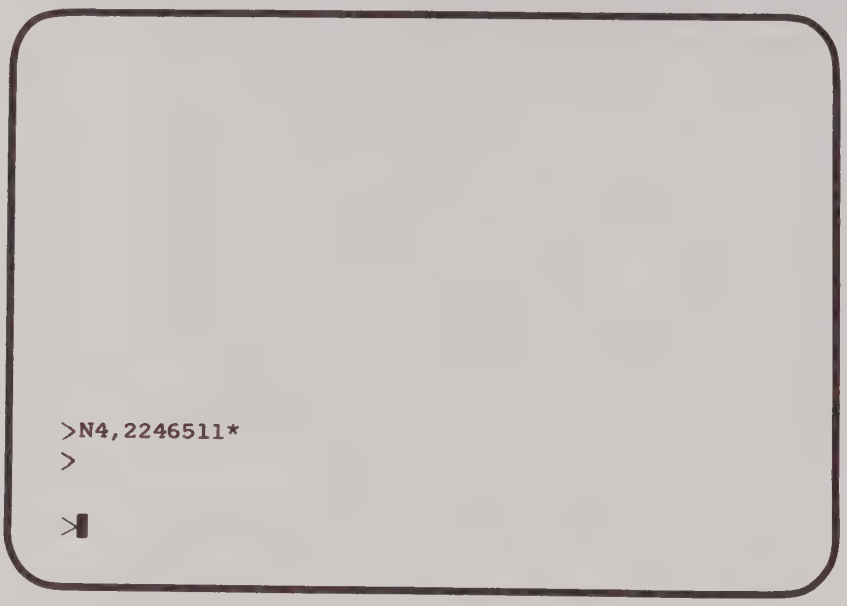



**Figure 25—Address Instruction**

Step 14. The two instructions programmed in steps 11 and 13 make up the call program currently stored in the Model 41-3A. (Additional instructions could be added to this program.) To review the current call program as shown in Figure 26, ***key three successive CTRL B commands.***

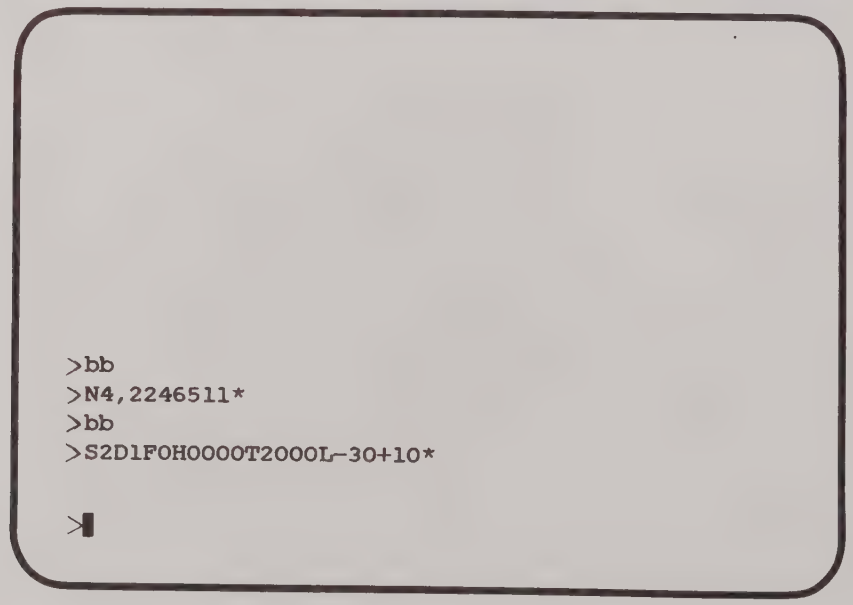



**Fig. 26—Move Backward Mode**

Step 15. Figure 26 reveals the stored instructions in reverse order. To view the program in a forward order, ***key a RETURN to exit the backward mode, then key two CTRL F commands.***

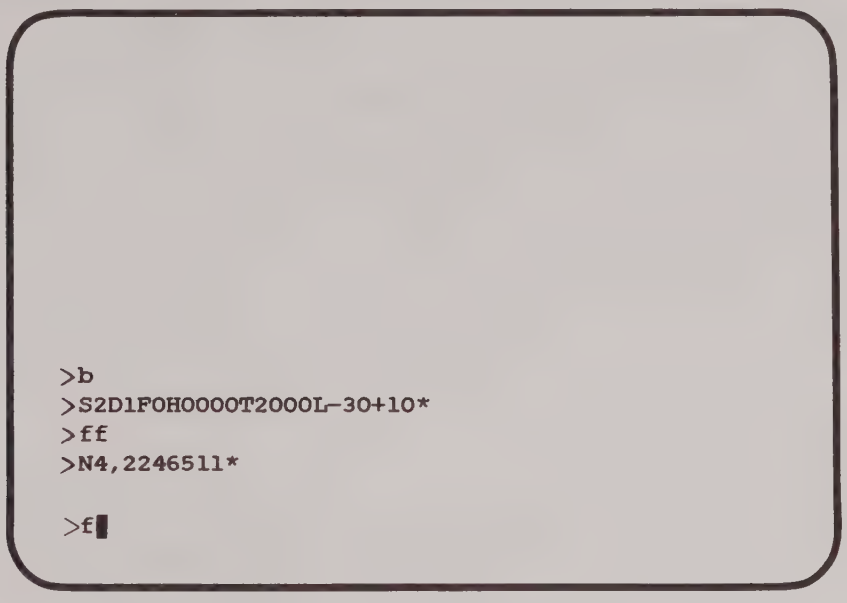



**Fig. 27—Move Forward Mode**

Step 16. This step returns the Model 41-3A to its system ready mode (Figure 13). ***First, use a <RET> to exit the forward mode of step 15. Then key a CTRL E to exit the edit mode and receive a system ready message.***

Step 17. Steps 17 thru 21 use the report mode to clear any report data previously stored in the Model 41-3A. ***Press key R.***

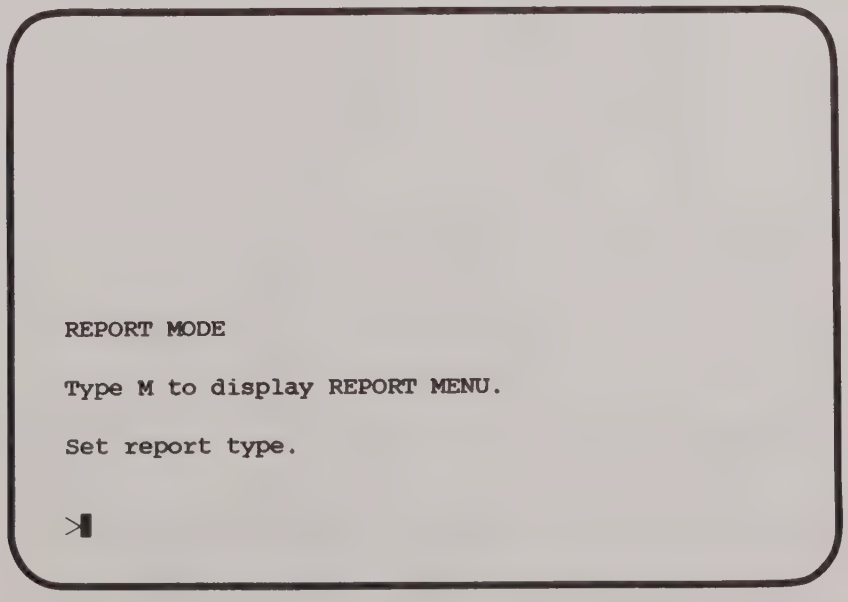



**Fig. 28—Report Mode**

Step 18. *Type M to obtain the report menu of Figure 29.*

```
>REPORT MENU

COMMAND  |  DESCRIPTION
---------|-----------------------------------------
 <RET>   |  Exit without affecting report status.
   S     |  Display report status.
   A     |  Print out a report for each call.
   E     |  Print out exception reports.
   H     |  Print out hourly summary reports.
   D     |  Store all reports requested.
 CTRL H  |  Cancels hourly reports.
 CTRL P  |  Cancels the above report types (A,E,D).
 CTRL C  |  Resets all test accumulators.
 CTRL B  |  Clears stored report data.
-------------------------------------------------

REPORT MODE

Type M to display REPORT MENU.

Set report type.

>
```

**Fig. 29—Report Mode Menu**

Step 19. *Use a CTRL B to clear (remove) any stored report data and a CTRL P to cancel any requested reports. Then key in the S command to view the report status of Figure 30.*

```
    REPORT TYPE     |     STATUS
------------------------------------
 ALL CALL Reports   |       RESET
 EXCEPTION Reports  |       RESET
 HOURLY Reports     |       RESET
 STORE ALL Reports  |       RESET
------------------------------------

REPORT MODE

Type M to display REPORT MENU.

Set report type.

>
```

**Fig. 30—Report Status**

Step 20. The status example of Figure 30 shows that no report types have been requested. ***Enter a <RET> to exit the report mode and return to the system ready condition (Figure 13).***

Step 21. Steps 21 thru 23 use the operate mode to perform a dialing operation. ***Enter a CTRL O (use letter O, not digit zero).***

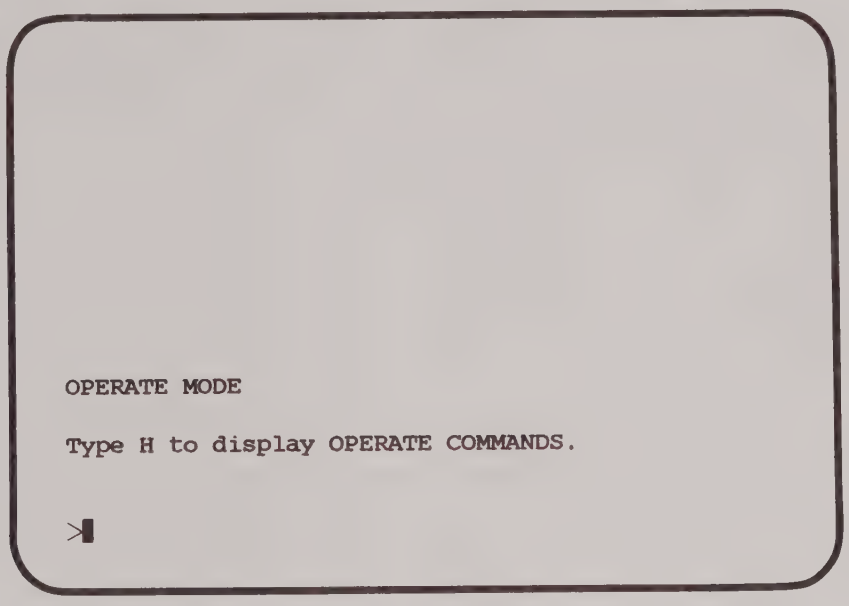



**Fig. 31—Operate Mode**

Step 22. ***Type H.***

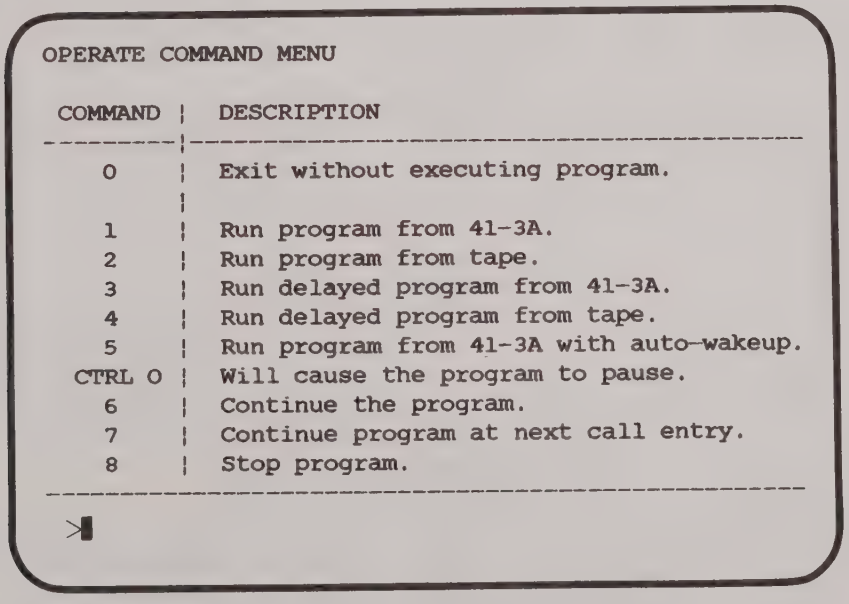

OPERATE COMMAND MENU
COMMAND | DESCRIPTION
0 | Exit without executing program.
1 | Run program from 41-3A.
2 | Run program from tape.
3 | Run delayed program from 41-3A.
4 | Run delayed program from tape.
5 | Run program from 41-3A with auto-wakeup.
CTRL O | Will cause the program to pause.
6 | Continue the program.
7 | Continue program at next call entry.
8 | Stop program.
>

**Fig. 32—Operate Command Menu**

Step 23. *Type digit 1.*

```
>1FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
PROGRAM RUNNING


CALL SUMMARY

MODE-DP
DIALER NUMBER
2246511E

41-3A ID:    EXERCISE 1
TIME       09:40 07-28-84
TOTAL CALLS     4
TEST OK
CHN A           4
CHN B
NO DIALTONE     4
OPEN C-LEAD
REV DRNG DL
REORDER
REORDER+ANS
BUSY+ANS
BUSY
LOW LEVEL
NO 1KHZ         4
HIGH LEVEL
NO ANSWER
INC CKT FLT
C-MESSAGE

SYSTEM BUSY - PURGING REMAINING TAPE

SYSTEM BUSY - INITIALIZING TAPE DRIVE

SYSTEM READY

Type H to display COMMAND MODE.

>
```

**Fig. 33—Program Run Example**

Step 24. This completes the programming exercise. The data transfer and summary report modes of Figure 11 were not included in the programming exercise. All the control modes of Figure 11 are discussed under appropriate subject headings in the paragraphs which follow.

## B. System Reset

**3.05** In the system reset condition the internal processor of the Model 41-3A is initialized. Previously stored programming and data are preserved.

**3.06** The Model 41-3A transmits an initial system reset message (see Figure 12) after its power switch is turned on and its POWER INTERRUPT indicator begins flashing. An entry other than CTRL Z at this time causes a retransmission of the reset message. Use of the CTRL Z command at this time turns off the POWER INTERRUPT indicator and places the Model 41-3A in a system ready status.

> *Note:* The Model 41-3A's front panel RESET pushbutton can also be used to turn off a flashing POWER INTERRUPT indicator and place the Model 41-3A in a system ready status.

**3.07** Following a system ready message, a CTRL Z can be used at any time to cause a system reset condition. The CTRL Z reset has the same effect as a momentary Model 41-3A power interruption. Approximately five seconds are required to implement a CTRL Z system reset (more time may be required if the Model 41-3A is used with a 5900-00-920/921 tape drive).

## C. System Ready

**3.08** The system ready mode is the access to all other control modes of the Model 41-3A w/ERC. (The Model 41-3A can also be operated from its own panel controls while in the system ready mode.)

**3.09** Prior to a ready condition, the Model 41-3A transmits a rewind command which directs the tape drive (if present) to rewind its cassette. Therefore, a busy message precedes a ready indication at the terminal. (See Figure 13.)

**3.10** While in the system ready mode, an operator can request a displayed list of proper mode commands by typing the H key (see Figure 14). Additional messages and instructions appear as other control modes are implemented. The Model 41-3A automatically returns to a system ready condition following execution of certain functions and keyboard entries.

## D. ID Code

**3.11** Key I is used to obtain the ID programming mode (see Figure 15). A code or name can then be assigned to identify either the Model 41-3A unit in use or its stored call program. This identification code is then presented with other appropriate messages or reports.

**3.12** The indication NOT PROGRAMMED appears when no code has been previously assigned. If previously assigned, the programmed ID code appears in place of this negative indication. The instruction to set the identification code is ignored if no change in the assigned code is required. Pressing the RETURN key (indicated as a <RET> entry) returns the Model 41-3A to the system ready mode.

**3.13** An ID code consists of up to 14-alphameric characters (including spaces). As shown in the example below, Table F, each character is displayed as keyed. Either the 14th character or a <RET> stores the assembled code in the memory of the Model 41-3A. A confirmation is presented before the Model 41-3A returns to the system ready condition. The ID mode is used as often as needed to change the ID code.

**TABLE F**

**ID CODE EXAMPLE**

| ENTRY | DISPLAY |
|---|---|
| SXS<SP>CO<SP>UNIT<SP>A1 | >SXS CO UNIT A1<br>41-3A ID: SXS CO UNIT A1<br>SYSTEM READY<br><br>Type H to display COMMAND MENU.<br>> |
| *Note:* In the above example entry, <SP> designates a SPACE BAR entry. | |

## E. System Time and Date

**3.14** The time and date mode (key T) is used to set the internal 24-hour clock of the Model 41-3A. Both the current unit ID code and system time and date are shown in the mode display (see Figure 17). Ignore the instruction to set the time and date if no change is required. Keying a <RET> at this time returns the Model 41-3A to the system ready mode.

**3.15** The entry format for time and date is a sequence of two-digit entries for hour, minute, month, day, and year. Table G provides programming examples. Note that no spaces are keyed between the hour, minute, month, day, and year entries. The delineators colon (:), space, and dash (-) are automatically inserted in the time and date display. If a <RET> is keyed before a complete 10-digit entry is made, the time and date mode is exited without change to the current time and date display.

**TABLE G**

**TIME AND DATE EXAMPLES**

| TIME AND DATE | ENTRY FORMAT | DISPLAY |
|---|---|---|
| 12:30 am, December 16, 1985 | 0030121685 | 00:30 12-16-85 |
| 12:30 pm, December 16, 1985 | 1230121685 | 12:30 12-16-85 |
| *Note:* A correct time and date entry is based on a 2400-hour and calendar year (including leap year) period. No error checking is done on time or date entries. | | |

## F. Edit Mode

**3.16** The purpose of the edit mode is to allow a keyboard operator to assemble and store an initial test call program into the Model 41-3A. This mode can be used to delete, modify, or replace a program already stored in the Model 41-3A.

*Note:* The operate and data transfer modes provide alternate ways of loading a test call program into the Model 41-3A.

**3.17** A test call program is a set of instructions which direct the automatic dialing operations of the Model 41-3A. There are two types of instructions:

(a) switch control instructions which specify test parameters for one or more address instructions

(b) address instructions which specify the number of calls to a designated address (telephone number).

**3.18** Instructions vary in length (number of characters). Therefore, the total number of instructions which can be stored depends on how many individual switch control and address instructions are programmed by an operator. The total maximum limit varies from 85 to 256 instructions. (A test call program could consist of a single instruction.)

**3.19** Press key E to enter the edit mode. Following the edit mode message (see Figure 19), the edit prompt (>) is positioned at the first storage location of the memory space. If a test call program is already present in the 41-3A, its first instruction normally (but not necessarily) begins at this first storage location. The instruction is displayed just above the edit prompt and cursor (▮). The position of the edit prompt is maintained until an instruction is assembled and stored, or the edit prompt is deliberately repositioned (moved forward or backward) by the operator.

**3.20** Prior to editing an instruction, the operator can use key H to obtain an edit command menu (see Figure 21). This menu lists the commands available for programming (or editing) a test call program. (The previous position of the edit prompt is maintained when this menu is displayed.)

### 3.21 Switch Control Mode

*Note:* A switch control instruction overrides the control functions of many — but not all — front mounted controls of the Model 41-3A. The panel controls not overridden by programmed instruction continue to affect the operation of the Model 41-3A during its execution of a test call program. As a precaution, all Model 41-3A front panel controls should be preset for acceptable values and conditions (see paragraph 2.11).

**3.22** Before entering the switch control mode, a display of the format used to assemble a switch control instruction can be obtained by pressing key F. The functions and selections listed in this display (see Figure 22) are explained in detail in Table H. (The last position of the edit prompt is also maintained when this menu is displayed.)

**3.23** Press key S to enter the switch control mode. The letter S appears after the edit prompt to indicate entry into the switch control mode. At this point, if a previously stored instruction is displayed immediately above the edit prompt, it can be removed (cleared) from memory by keying a <RET>. Otherwise, keying a 1, 2, or 3 (for S#) sets the start dial function for a new instruction. Other function designators (D, F, H, and T) are automatically displayed. An L or C designator appears only if a 1-kHz tone or a C-message selection is programmed for the T (test OK on) function.

**3.24** A designator for the line select function is not displayed. Key a <RET>, or an A and B and <RET>, to select both channels and all lines. Press A or B and <RET> to select all lines of the A or B channel. An A or B followed by a line number (0, 1, . . . , or 7) and <RET> selects one line of channel A or B.

**3.25** An assembled instruction is stored in the memory of the Model 41-3A when the <RET> of a line select entry is keyed. The instruction is stored in the program location positioned by the edit prompt. Any instruction present in that location is replaced by the new instruction. The stored instruction is displayed with an appended asterisk (e.g., S1D2F3H0002T1188C30B2*), and the edit prompt then moves forward to the next program location.

**3.26** Each switch control instruction is normally followed by one or more associated address instructions. As instructions are stored in sequence, the edit prompt is advanced toward the end of the Model 41-3A's memory space. The message NOT ENOUGH MEMORY LEFT FOR SWITCH/CONTROL ENTRY is transmitted if additional switch control instructions can no longer be programmed. At this point, only an additional address instruction can be programmed.

**TABLE H**

**SWITCH CONTROL FUNCTIONS**

| FUNCTION | EXPLANATION |
|---|---|
| START DIAL (S#) | The start dial function programs one or both of two start dial conditions and replaces the control functions of the DELAY and DIAL TONE pushbuttons (START DIAL COMMAND). Possible selections are as follows: |

| SELECTION | PURPOSE |
|---|---|
| 1 | This selection permits dialing to begin after a preset time interval expires following a line seizure (off-hook indication). Also, when an address (dialing number) instruction contains a wait-for-start-dial (W) condition, the same delay condition must be satisfied before dialing can resume. The preset time interval is determined by the START AFTER control setting on the Model 41-3A. |

**TABLE H (Cont)**

<table>
<tr><th>FUNCTION</th><th>EXPLANATION</th></tr>
<tr><td>START DIAL<br>(S#)<br>(Cont)</td><td>
<table>
<tr><th>SELECTION</th><th>PURPOSE</th></tr>
<tr><td>2</td><td>This selection allows dialing to begin or resume upon receipt of dial tone. This dial tone selection includes wink and similar MF start dial signals; dialing begins or resumes when a dial tone or wink is received. The maximum wait interval for a dial tone indication is determined by the START AFTER control setting.</td></tr>
<tr><td>3</td><td>This selection programs the Model 41-3A to:<br>(a) begin dialing when dial tone (or an MF wink signal) is received after an initial off-hook indication, and<br>(b) when a W is programmed, to resume dialing after a preset time interval expires (the time interval is determined by the FAULT AFTER control setting).</td></tr>
</table>
</td></tr>
<tr><td>DIAL TYPE<br>(D#)</td><td>This function programs the type of dialing and replaces the control function of the TT/MF/DP toggle switch (DIALER PROGRAM). The dial pulse (DP), dual-tone multifrequency (TT), or multifrequency (MF) dialing selections require various presettings of the SPEED, % BREAK, and IDT thumbwheels, and of the LEAK/LOOP switches. Possible selections are as follows:
<table>
<tr><th>SELECTION</th><th>PURPOSE</th></tr>
<tr><td>1</td><td>This DP (dial pulse) selection requires appropriate settings of the SPEED, % BREAK, and IDT thumbwheels, and of the LEAK/LOOP switches.</td></tr>
<tr><td>2</td><td>This DTMF (dual-tone multifrequency) selection requires appropriate settings of the SPEED and % BREAK thumbwheels.</td></tr>
<tr><td>3</td><td>This MF (multifrequency) selection requires appropriate settings of the SPEED and % BREAK thumbwheels.</td></tr>
</table>
</td></tr>
<tr><td>FAULT ON<br>(F#)</td><td>The fault function replaces the control functions of the OPEN C-LEAD and REV DRNG-DIAL pushbuttons, and programs none, one, or both of two conditions which will cause a fault condition. Possible selections are as follows:
<table>
<tr><th>SELECTION</th><th>PURPOSE</th></tr>
<tr><td>0</td><td>When this selection is made, the Model 41-3A ignores an open C-lead or tip/ring polarity reversal during dialing.</td></tr>
<tr><td>1</td><td>This selection causes a fault condition when an open C-lead is detected.</td></tr>
<tr><td>2</td><td>This selection causes a fault condition when a tip/ring polarity reversal is detected during dialing. (The T/R reversal discloses reversed wipers in SXS switch trains and faulty message accounting equipment.)</td></tr>
<tr><td>3</td><td>This selection causes a fault condition when an open C-lead or a tip/ring polarity reversal during dialing is detected.</td></tr>
</table>
</td></tr>
</table>

**TABLE H (Cont)**

| FUNCTION | EXPLANATION |
|---|---|
| HOLD ON (H####) | This function sets conditions which cause the Model 41-3A to halt operation and hold the line under test. The HOLD ON pushbuttons replaced by this function are REORDER, BUSY, R or B + ANSWER, and FAULT. A 4-digit selection entry (####) is required.<br><br>Single or combined reorder, busy, and fault hold conditions as well as a no-hold condition can be selected. A no-hold condition is programmed only when the #### entry contains all zeros, i.e., #### = 0000. Any digit sequence other than four zeros sets one or more hold conditions. For example, entry 0002 programs a busy hold condition, whereas entry 1200 sets both a reorder and busy hold condition.<br><br>A reorder selection programs the Model 41-3A to halt when a reorder tone is received without a false tip/ring polarity reversal (answer) indication. The reorder selection is programmed by placing digit 1 in one or more positions of the #### format, e.g., 1000, 0100, 0010, 0001, 1100, 1010, 1001, etc.<br><br>A busy selection causes a halt when a busy tone is received without a false tip/ring polarity reversal (answer) indication. The busy selection is programmed by placing digit 2 in any or all digit positions of the #### format, e.g., 2000, 0200, 0020, 0002, 2200, 2020, 2002, etc.<br><br>A combined answer and reorder or busy selection programs the Model 41-3A to halt when a false tip/ring polarity reversal (answer) indication and a reorder or busy tone are received. This selection is programmed by placing digit 4 in any or all positions of the #### format, e.g., 4000, 0400, 0040, 0004, 4400, 4040, 4004, etc.<br><br>A hold on fault selection programs the Model 41-3A to halt when a fault is detected. Hold on fault conditions include a no dial tone (or no wink) condition as well as the programmed Fault On and Test Complete functions. The hold on fault condition is programmed by placing digit 8 in any or all digit positions of the #### format, e.g., 8000, 0800, 0080, 0008, 8800, 8080, 8008, etc. |
| TEST OK ON (T####) | This function programs the call completion conditions, and replaces the control functions of the ANS SUP., 1KHZ TONE, and INC CKT pushbuttons. It also adds a C-message noise feature to the Model 41-3A. To record a test OK for each test call, the programmed test complete requirements must be detected.<br><br>***Note:*** The C-message and 1-kHz measurement functions are available only with the C-Message Noise & 1-kHz Level Option.<br><br>Single or various combinations of answer supervision, 1-kHz level, incoming circuit, and C-message noise level detection requirements can be programmed. A 4-digit selection entry #### is required.<br><br>The ANSWER supervision selection requires the detection of a tip/ring polarity reversal. This selection is programmed by placing digit 1 in any or all digit positions of the #### format, e.g., 1###, #1##, ##1#, ###1, 11##, #11#, . . . , 1111. (Note that with a 1111 entry, no other test complete requirement is programmed.) |

**TABLE H (Cont)**

| FUNCTION | EXPLANATION |
|---|---|
| TEST OK ON (T####) (Cont) | The milliwatt signal source for the 1-KHZ TONE selection can be the Model 41-3A's built-in test line or another source (such as Test Line Type 102, or Northeast Electronics Division types TTS 39 and 52) which can provide a milliwatt signal for a duration of at least 1700 milliseconds. The 1-kHz selection is programmed by placing digit 2 in any or all digit positions of the #### format, e.g., 2###, #2##, ##2#, ###2, 22##, #22#, . . . , 2222. (Note that with a 2222 entry, no other test complete requirement is programmed.)<br><br>The INC CIRCUIT selection requires the detection of a completed call to the internal test line of the Model 41-3A; therefore, the INCOMING CIRCUIT terminals must connect to an incoming circuit. This selection is programmed by placing digit 4 in any or all digit positions of the #### format, e.g., 4###, #4##, ##4#, ###4, 44##, #44#, . . . , 4444. (Note that with a 4444 entry, no other test complete requirement is programmed.)<br><br>The C-message measurement function applies only to test line types (such as newer versions of Test Line Type 100) which provide a milliwatt signal presence for a minimum of 1700 milliseconds, followed by a signal-quiet interval of 2500 milliseconds. The C-message selection is made by placing digit 8 in any or all digit positions of the #### format, e.g., 8###, #8##, ##8#, ###8, 88##, #88#, . . . , 8888. (Note that with an 8888 entry, no other test complete requirement is programmed.) |
| 1-KHZ WINDOW (L######) | This function is used to program the min/max level requirements for detection of a milliwatt signal when the 1-KHZ LEVEL parameter is selected as a TEST COMPLETE requirement. The range of level measurement is −30 to +10 dBm.<br><br>The detection window is set by keying consecutive min and max entries, each consisting of a ± sign and 2-digit value. The entry +10-09, for example, specifies window limits of −9 to +10 dBm. |
| C-MESSAGE LEVEL (C##) | This function is used to program the level requirement for noise detection when the C-MESSAGE TONE parameter is selected as a TEST COMPLETE requirement. The range of level measurement is 15 to 55 dBrnC.<br><br>The threshold level is set by keying a 2-digit value. Entry 25, for example, specifies an upper noise threshold of 25 dBrnC. |
| LINE SELECT | The channel and line function determines which input channel (A or B, or both) and associated telephone line/s (0 through 7) of the Model 41-3A are internally engaged for testing. It replaces the control functions of the A TEST and B TEST pushbuttons.<br><br>Line select is the last function of a switch/control instruction. No designator is displayed for this function. Depending on selections made for the test complete function, the line select function is programmed following the parameter entry for the test complete, 1-kHz window, or C-message function.<br><br>Both channels and all (16) lines are selected either by keying a <RET> or entering AB followed by a <RET>.<br><br>A single channel (8 lines) is selected by entering an A or B followed by a <RET>.<br><br>A single line is selected by entering an A or B (channel) and a line number (# = 0, 1, . . . , 6, or 7), followed by a <RET>. |

### 3.27 Edit Address Mode

**3.28** An address instruction provides the Model 41-3A with a telephone number to be dialed and the number of test calls to be made. A wait-for-start dial (W) instruction and a special end of number (E) instruction can also be programmed in the telephone number. Address instructions vary in length depending on the number of digits/codes used. Normally, one or more address instructions are preceded by a switch control instruction (which sets the functional parameters of the test calls).

**3.29** Prior to entering the address mode, a display of the address format can be obtained by pressing key A. This display (see Figure 24) defines the programmable elements of an address instruction. (The last position of the edit prompt is not changed by this display.)

**3.30** Press key N to enter the edit address mode. An N appears after the edit mode to indicate entry into the address mode. A <RET> at this point removes (clears) any previously stored instruction which is displayed immediately above the edit prompt. Otherwise, keying a number from 1 to 9999 sets the number of times an address is to be dialed. The operator then inserts a comma, then keys the address digits to be dialed.

**3.31** The keyed address should be a number necessary to reach a type 102 or other suitable test line. If the internal test of the Model 41-3A is used, the address is the number of the incoming circuit connected to the 41-3A. The KP and ST codes for MF dialing are not keyed with the address digits; the 41-3A automatically transmits these codes at the proper time. Codes W and E are set within the address digits as appropriate; the entry 9W2246511, for example, programs a wait-for-start-dial (W) condition after the digit 9 is dialed. For CAMA-ANI digits, code E separates the called party number from the calling party number (up to 16 characters). It is not necessary to end the calling party number with an E code.

**3.32** The DELETE (or RUB OUT) key is used to remove an incorrectly keyed digit or code. A deletion mark (\) appears next to the character to be deleted. Characters are deleted from right to left. For example, digits 3 and 7 are marked for deletion from the assembled instruction N44,237 7 3246511 with the result that N44,2246511 is the instruction to be stored.

**3.33** The test call number can consist of up to 32 digits and codes. When this limit is exceeded, the message ERROR MODE CONDITION appears and the test call number is aborted. When the message NOT ENOUGH MEMORY LEFT FOR SWITCH/CONTROL ENTRY appears, only an address instruction containing 16 or less characters can be stored. Characters beyond the 16th character are deleted.

**3.34** An assembled address instruction is stored by keying a <RET>. The instruction is stored in the program location positioned by the edit prompt. Any instruction previously stored in that location is replaced by the new instruction. The stored instruction is displayed with an appended asterisk (e.g., S1D2F3H0002T1188C30B2*). The edit prompt then moves forward to the next available program location.

### 3.35 Other Edit Commands

**3.36** Several editing functions are provided in addition to the switch control and address instruction modes discussed above. The CTRL U command, for example, allows the operator to abort a partially assembled instruction prior to its being stored in memory. (The position of the edit prompt is not changed by this action.)

**3.37** The move forward and backward commands, CTRL F and CTRL B, allow the edit prompt to be selectively positioned in the program memory space. For example, beginning with the first instruction of a stored program, a sequential display of the call program can be obtained by keying repeated CTRL F commands.

**3.38** Keying a CTRL F entry places the edit prompt in a move-forward mode, as indicated by the letter f which appears next to the edit prompt (>f). Next, another CTRL F, or a number from 0 to 999, <RET>, or a CTRL U determines how the edit prompt is advanced through the program. Pressing the key 0 (zero) and <RET>, or just a <RET> alone, causes an exit from the mode without any advancement through the stored program. A complete three digit entry, or a one/two digit entry and <RET>, causes the edit prompt to scroll (sequentially move forward) the number of instructions designated, or until the last memory location is reached. The scroll defaults to 250 for an entry value between 250 and 999. This scroll action is stopped by a CTRL S. The message STOPPING SCROLL FUNCTION AND JUMP TO TARGET ENTRY appears, and the prompt is moved directly to the instruction location designated. Repeated CTRL F entries move the edit prompt forward instruction-by-instruction. The move-forward mode and a move-forward entry can be aborted with a CTRL U.

**3.39** The move-backward mode (CTRL B) functions in the same manner as the move forward mode described in the previous paragraph, except that movement is reversed (as indicated by the letter b which appears next to the edit prompt, >b). These two modes of the edit function are used to position the edit prompt so that selected instructions can be reprogrammed by use of the S or N command mode, or removed by use of the S<RET> and N<RET> commands (press S or N key, then the RETURN key). Notice also, that all instructions stored forward of the last displayed instruction can be removed by a simple CTRL C entry.

## G. Report Mode

**3.40** The Model 41-3A w/ERC transmits two general types of reports:

(1) a report which provides test result data pertaining to an individual test call

(2) a report which provides a summary of test results for one or more test calls.

*Note:* The above general report types are discussed in greater detail under subject headings Call Report and Summary Report (paragraphs 3.48 and 3.54).

**3.41** A summary report is always transmitted following the complete execution of an address instruction. These reports are stored in the internal memory of the Model 41-3A for later retrieval. The Model 41-3A also transmits a report called an exception report for an individual test call when the Model 41-3A halts its dialing operation for a programmed hold condition. These exception reports are not stored in memory.

**3.42** In addition to the above routine reports, the report mode allows the operator to request reports and to store these reports in memory.

*Note:* An additional report mode is provided by a command which is listed as Command S in the 41-3A Remote Service Analyzer Command Menu. See Figures 11 and 14. This report mode is discussed under the subject heading Summary Request (part 3J).

**3.43** Press key R to obtain the report mode (see Figure 28). Once in the report mode, key R can be used to obtain a list of report mode commands (Figure 29). Also, key S can be used to display the current request status (Figure 30).

**3.44** A report request is made by pressing the appropriate key (A, E, or H) listed in the report menu. The Model 41-3A remains in the report mode so that other requests can be made.

**3.45** Press key A to program the Model 41-3A to send an individual call report for each test call attempted (regardless of test results). Press key E to request an exception report for a test call not resulting in a test OK. Press key H to request the transmission of summary reports every hour on the hour. The A, E, or H requested reports are stored in memory when key D is pressed.

*Note:* Although all reports are transmitted, the Model 41-3A has sufficient memory to guarantee at least 200 reports (call or summary) will be stored. A single address instruction could result in thousands of reports. For this reason report and store requests should be made carefully.

**3.46** Report requests can be cancelled by a CTRL H or CTRL P. Command CTRL C resets test result accumulators so that summary reports will then provide only current data. The CTRL B request removes all reports currently stored in memory.

**3.47** Enter a <RET> to exit the report mode and return to a system ready condition.

## 3.48 Call Report

**3.49** As shown in Figure 34, an individual call report gives the following information:

- System ID code
- Time and date of the call
- Channel line used
- Dialing mode
- Test result
- Digits dialed (CAMA-ANI calling party digits are shown below the called party digits).

*Note:* To record a TEST OK result, a test call must satisfy its call completion requirements; i.e., it must meet the programmed TEST OK ON selections (switch control instruction). Failure conditions which prevent call completion include the absence of dial tone (or no wink), an open C lead, a reversal during dialing, as well as answer supervision, incoming circuit, 1-kHz level, and C-message noise failures.

**3.50** Only digits successfully dialed are shown in a call report. An E terminates all digits for the DP or TT mode. A wait for start dial (W) is shown in proper position with the dialed digits. All MF digits are preceded with a K and terminated with an S to indicate respective KP and ST code tones. Dialed digits are shown on two lines to include both called party digits and CAMA-ANI calling party digits.

**3.51** When the threshold level of a programmed C-message function is exceeded, the actual measured level is shown (in dBrnc). Detected noise levels are rounded up at the half dB point; for example, values from 26.5 to 27.4 dBrnC are displayed as digits 27. The Model 41-3A requires at least 4000 milliseconds of detected milliwatt signal time and at least 5000 milliseconds of quiet (no signal) time during which noise level is measured. Noise measurement begins 2500 milliseconds after the end of milliwatt and is conducted over a maximum period of 1000 milliseconds. The milliwatt measurement period must be completed in such a time that the total duration of a test call does not exceed 4 times the setting of the NETWORK DLY control. If a proper milliwatt signal is detected, but an insufficient quiet (absence of signal) interval is measured, an exception report with the value 99 is generated. When a proper milliwatt signal is not detected, the exception report indicates a NO 1 KHZ condition.

**3.52** When the 1-kHz signal level falls outside programmed window limits, the measured dBm value with an appropriate LOW LEVEL or HIGH LEVEL indication is provided in the exception report. Detected levels are rounded up at the half dB point; for example, +6.5 to +7.4 dBm is displayed as digit 7. If 4000 milliseconds of signal duration is not detected during a time span equal to 4 times the setting of the NETWORK DELAY (front panel) control, a NO 1 KHZ indication appears in the exception report.

> ***Note:*** The C-message and 1-kHz measurement functions are available only with the C-Message Noise & 1-kHz Level Option. To ensure a correct test response, set the NETWORK DLY time at approximately 15 seconds for 1-kHz tone or C-message noise measurements.

**3.53** If an all reports request is made (report mode command A), an exception report is transmitted each time a test call is dialed regardless of a test OK result.

```
41-3A ID;       UNIT 1
TIME          09:14 11-02-84

CHN B-4
MODE-DP

NO ANSWER
DIGITS DIALED:
2246511E
K2246646S

>
```

**Fig. 34—Call Report Example**

### 3.54 Summary Report

**3.55** As shown in Figure 35 below, the message CALL SUMMARY precedes a summary report. Information is listed from top to bottom as follows:

- Dial mode
- Dialed number (called party digits are shown above CAMA-ANI calling party digits, if any)
- 41-3A ID code
- Time and date of report
- 17 result categories with total counts (if any)
- Overflow messages (if any).

**3.56** The DIALED NUMBER is shown as programmed in the address instruction. The W indicators are included with dialed digits. All DP and TT mode numbers end in an E. All MF numbers are enclosed with K and S designators. Calling party numbers (if any) are shown below called party numbers. Each test result category is listed even when no total counts are shown. An overflow message appears only when the Model 41-3A attempts to store counts for more than 9,999 test calls.

```
CALL SUMMARY

MODE-TT
DIALER NUMBER
9W1W2246511E

41-3A ID:      SXS CO UNIT 1
TIME         09:14 11-02-84
TOTAL CALLS  324
TEST OK      280
CHN A        179
CHN B        145
NO DIALTONE    4
OPEN C-LEAD    4
REV DRNG DL    4
REORDER
REORDER+ANS
BUSY+ANS       1
BUSY           4
LOW LEVEL      2
NO 1KHZ       16
HIGH LEVEL     3
NO ANSWER     17
INC CKT FLT    6
C-MESSAGE
```

**Fig. 35—Summary Report Example**

### H. Operate Mode

**3.57** Press CTRL O (letter O) to obtain the operate mode (see Figure 31). Once in the operate mode, pressing key H provides a menu of mode (Figure 32). An EXIT OPERATE MODE message is transmitted when digit 0 is keyed.

**3.58** The operate mode is used to execute a test call program. There are three ways (digit commands 1, 3, and 5) to execute the call program currently stored in the Model 41-3A. Two ways (commands 4 and 5) are provided to run a taped program. The message PROGRAM RUNNING notifies the operator that a call program is being executed. Appropriate call and summary reports are also transmitted.

### 3.59 Operate Commands

**3.60** Operate commands 1 and 3 are the same except that a future start time and date must be set if digit 3 is selected. After the message ***Set operate start time and date***, enter 2-digit numbers for the hour, minute, month, day, and year. For example, number sequence 1900123085 sets the program execution time for 7 p.m. on December 30, 1985.

**3.61** Operate command 5 is the same as command 1, except that the digit 5 selection is intended for use with a printer which requires "wakeup" time to come up to speed and time to complete a carriage return.

> ***Note:*** If command 1 is selected and characters are lost at the beginning of a report printout or at the start of each line, then operate command 5 should be used in place of command 1.

**3.62** Keying digit 4 is the same as keying digit 2, except that command 4 requires a specified start time as explained for a digit 3 operation. In either case, the taped program is first loaded into the Model 41-3A, then executed. (The new program replaces a previously stored program.) If the 41-3A detects a transmission error in the program data, it sends the message ERROR MODE CONDITION and a prompt >. The 41-3A then pauses 3 seconds before requesting another transmission from the tape drive. This action continues until proper data is received, or until any keyboard entry during the 3-second pause causes the 41-3A to abort the operate mode.

### 3.63 Hold Conditions

**3.64** The running of a call program is interrupted by keying a CTRL O command. The Model 41-3A transmits a summary report and the message 413A HELD–ALARM RESET message. A "beep" is also transmitted to the terminal. Press key 6 to release this hold condition and continue the program, press key 7 to execute the next (if any) address instruction, or press 8 to stop the program and return to a system ready condition. (Appropriate summary reports are transmitted in conjunction with these commands.)

**3.65** If the Model 41-3A detects a programmed hold condition, it transmits an exception report and the message 413A HELD – ALARM SET. An alarm tone is also sounded at the Model 41-3A. Press key 6 or 7 to silence the alarm at the Model 41-3A. After transmission of an alarm reset message, key digit 6 or 7 to continue, or an 8 to stop the program.

### I. Data Transfer Mode

**3.66** Press key D to enter the data transfer mode. The Model 41-3A transmits a DATA TRANSFER MODE message which includes an optional help instruction (type H). When keys D and H are pressed, the transmitted message is as shown in Figure 36 below. Notice that keying digit 0 results in an immediate exit from the data transfer mode.

**3.67** Figure 37 illustrates a dump-program transfer. Mode command 1 was keyed for this example. Only this selection results in an instruction to label or name the program to be taped. For this example, the program was labeled by keying the entry PROGRAM NO. 1 and a <RET>. If a label is not needed, just enter a <RET>. Key a CTRL U to abort a partial entry. The transmission is shown to the right as it appears on a video terminal. Brief explanations are given to the left of the transmitted elements. Busy messages and control characters sent for other transfer operations are similar to those shown in Figure 37, but program or report content depends on prior operations and the type of transfer.

**3.68** As indicated in Figure 36, test results can be formatted into call and summary reports which include test categories, space tabs, carriage returns, line feeds, etc. Test results can also be unformatted (a stream of raw data without categories, tabs, etc.) for use by a host computer (micro, mini, etc.)

**3.69** When the Model 41-3A transfers its call program (dump commands 1 and 2), or transfers unformatted test data (command 6), it includes block-check characters to facilitate error detection by a host computer. The Model 41-3A itself performs an error detection routine on the program sent to tape via command 1.

It also performs an error detection routine on a program received via command 7 or 8. If an error is detected, it transmits the message MODE ERROR CONDITION. Therefore, block-check characters must be generated by the host computer when it loads the Model 41-3A. The generation of block-check characters is discussed in detail under subject heading "Computer/41-3A Communication Requirements" (part 3K).

> ***Note:*** The MODE ERROR CONDITION message is also transmitted for invalid command conditions. For example, the message appears if a request is made to store information on tape when a tape drive is not used. (Only the MFE Model 2500 cassette tape drive can be used with the Model 41-3A.)

**3.70** Prior to dumping formatted data to tape, reports stored in the Model 41-3A can be transmitted to the terminal for a display/printout (command 4). After a call program and/or formatted data are stored on tape (commands 1 and 5), the tape's content can be viewed at the terminal (command 3).

**3.71** The Model 41-3A does not perform error detection for information transmitted to the terminal via commands 3 and 4, and the transmission of such information can be interrupted. A prompt (>) appears after the call program and after each report. An approximate 2-second delay follows the prompt before transmission resumes. If any keyboard character is pressed within the delay period, the transfer of other information is prevented. This interruption remains until key C is pressed to continue the transmission, or until key S is used to stop the transfer operation and to cause a return to the system ready condition. In the case of a transmitted report (command 4), pressing key R allows a repeat of the last report.

```
DATA TRANSFER MODE

Type H to display DATA TRANSFER COMMANDS.

>

DATA TRANSFER COMMAND MENU

 COMMAND  :  DESCRIPTION
-------------------------------------------------------------
    0     |  Exit without data transfer.
          |
    1     |  Format tape and dump program to tape
    2     |  Dump program to host device.
    3     |  Dump program and data from tape.
    4     |  Dump report data from 41-3A (Formatted).
    5     |  Dump report data from 41-3A (Formatted) to tape.
    6     |  Dump report data from 41-3A (Unformatted).
          |
    7     |  Load program from tape into 41-3A.
    8     |  Load program from host device into 41-3A.
-------------------------------------------------------------
>
```

**Fig. 36—Data Transfer Command Menu**

```
(busy message)          SYSTEM BUSY - INITIALIZING TAPE DRIVE

(programmed ID code)    41-3A ID:    001

(operator instruction)  Set tape program name (32 characters maximum).

(operator's entry)      >PROGRAM NO. 1
(busy message)          SYSTEM BUSY - TRANSFERRING DATA

(tape control characters) 22222222222
(assigned program name)   PROGRAM NO. 1

                        S1D1F0H1000T2000L-14+00
the call program and    N25,603W2246500*
block-check characters          :
as transmitted to               :
the tape drive          N25,603W2246511*
                        zp9

                        SYSTEM BUSY - PURGING REMAINING TAPE
(busy messages)
                        SYSTEM BUSY - TRANSFERRING DATA

(tape control characters) FFF

(assigned program name)   PROGRAM NO. 1

                        S1D1F0H1000T2000L-14+00*
the call program        N25,603W2246500*
as stored on tape               :
                                :
                        N25,603W2246511*
                        zp9

(busy message)          SYSTEM BUSY - INITIALIZING TAPE DRIVE

(exit message)          EXITING CURRENT MODE

                        SYSTEM READY
(system ready mode)
                        Type H to display COMMAND MENU.

                        >
```

**Fig. 37—Transfer Example**

### J. Summary Request Mode

**3.72** Independently of the report mode, the S command listed in the 41-3A Remote Service Analyzer Command Menu (Figure 14) allows a user to obtain a summary report immediately following a system ready message. Note that this request is different from the S command listed in the report mode menu (Figure 29).

### K. Computer/41-3A Communication Requirements

**3.73** The following protocol and data format considerations apply when the Model 41-3A w/ERC is operated under control of a host computer (micro, mini, etc.). The information provided below is intended for use by a programmer or other software personnel.

### 3.74 Command Entries

**3.75** The host computer must send the same mode commands to the Model 41-3A as are entered via a terminal keyboard. After a system reset, for example, the ASCII code SUB (i.e., a keyboard CTRL Z) is required to place the 41-3A in the system ready condition.

*Note:* All characters sent to the Model 41-3A must be ASCII.

### 3.76 Mode Messages

**3.77** The Model 41-3A transmits the same mode messages to the computer as sent when operated via keyboard control. A line feed (LF) and carriage return (CR) delineate each line of a message. A second CR is attached to the line preceding a prompt (>) character. The two CR's and the prompt are an indication to the computer that the 41-3A is awaiting a command entry. After power-up, for example, the Model 41-3A transmits the following reset message, then awaits ASCII code SUB.

SYSTEM<SP>RESET<LF><CR>
Type<SP>CTRL<SP>Z<SP>for<SP>
SYSTEM<SP>READY.<LF><CR><CR>
>

*Note:* The enclosures < > are shown above only to delineate a transmitted SP (space), LF, and CR from other transmitted characters (M, R, e, C, L, Z, etc.). These enclosures (< and >) are NOT transmitted; however, the single prompt character (3rd line) IS transmitted. The user may eliminate the prompt character after it is received.

**3.78** After reception of a system ready notification, the host computer may request the data transfer mode via a D character entry. The Model 41-3A then transmits a mode message and awaits a transfer request from the computer. Assuming the 41-3A contains a call program, the computer may request a dump program or unformatted report data transfer with an appropriate digit entry. The control characters and formats used by the 41-3A to transmit data for use by the host computer are discussed next.

### 3.79 Dump Program Format

**3.80** The Model 41-3A's program buffer is divided into 256 blocks of 16 elements each, where each element is an ASCII character. Program instructions are appended with a CR, and ETB's complete the remaining elements of a block. As an example, the program consisting of instructions S1D1F0H0000T0000 and N4,2246511 is stored as diagrammed in Figure 38.

**3.81** The Model 41-3A dumps its internal call program by first transmitting a start of text (STX) indicator. The 41-3A then transmits an image of its program buffer in the form of a continuous string of character records. All 4,096 buffer elements are sent. Normally, the first record contains the first program instruction. Filler codes (ETB's) used to complete an instruction block are sent as part of the next record. An LF is inserted before an instruction's CR code so that these records are appended by segment <LF><CR>. A string of 40 consecutive ETB's is affixed with a CR. This limits the maximum size of a record sent to the computer. Remaining ETB's (less than 40) are transmitted ahead of a block-check routine, which is sent to facilitate error checking by the host computer. Block-check characters are defined under subject heading Block-Check Generation (paragraph 3.85).

**3.82** Table I tabulates the complete format used by the Model 41-3A to dump its call program data. Notice that an acknowledgement from the computer is not required. After its data transmission, the 41-3A sends an exit and system ready message, then awaits a command from the computer. If the computer detects a transmission error, it can request a retransmission via the data transfer mode.

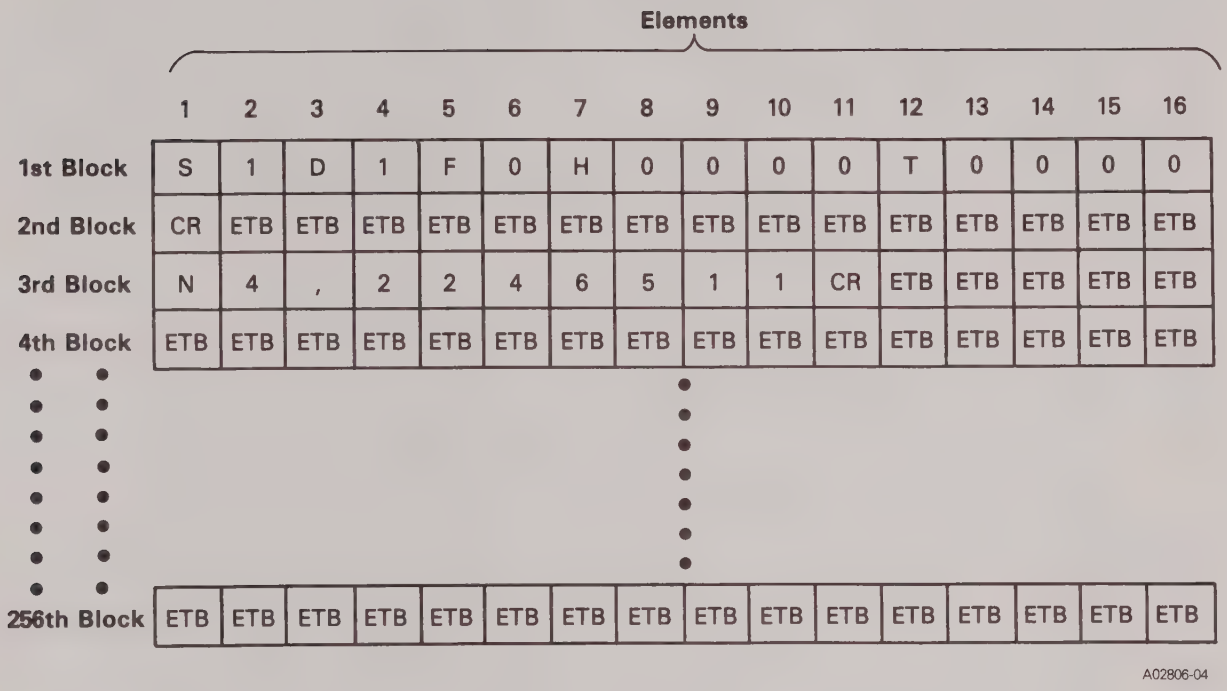

Elements
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
1st Block S 1 D 1 F 0 H 0 0 0 0 T 0 0 0 0
2nd Block CR ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB
3rd Block N 4 , 2 2 4 6 5 1 1 CR ETB ETB ETB ETB ETB
4th Block ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB
256th Block ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB ETB
A02806-04

**Fig. 38—Model 41-3A Program Buffer**

## TABLE I

## DUMP PROGRAM FORMAT

| CHARACTER/DATA | DESCRIPTION |
|---|---|
| STX | Start of text indicator |
| call program with added control and filler codes | Image of the Model 41-3A's internal call program buffer, consisting of 4,096 ASCII characters. Record blocks are delineated with LF and CR codes. A string of 40 consecutive ETB (filler) codes are marked with a CR. This limits the maximum record size sent to the computer.<br><br>As an example, the program of Figure 38 is transmitted as follows.<br><br>S1D1F0H0000T0000<LF><CR><br><15 ETB codes>N4,2246511<LF><CR><br><40 ETB codes><CR><br>⋮ } (transmitted 101 times)<br><40 ETB codes><CR><br><13 ETB codes> |
| z<br>BCC1<br>BCC2<br>LF<br>CR | Sequence (z<BCC1><BCC2><LF><CR>) marks the end of data. It is provided to facilitate error checking by the computer. All characters from STX to the final CR must be included in the computer's error detection routine. |

*Notes:*

1. No acknowledgement by the computer is required after the above transmission; the Model 41-3A transmits the following message and awaits a command from the computer.

   EXITING<SP>CURRENT<SP>MODE<LF><CR><br>
   SYSTEM<SP>READY<LF><CR><br>
   Type<SP>H<SP>to<SP>display<SP>COMMAND<SP>MENU.<LF><CR><CR><br>
   >

2. Block-check characters are defined under the subject heading Block-Check Generation (paragraph 3.85).

3. If the computer detected a transmission error, it can request a re-transmission via the data transfer mode.

### 3.83 Report Data Format

**3.84** Tables J, K, and L define the formats used by the Model 41-3A when it dumps unformatted report data (transfer command 6). Table J defines the header block which precedes transmission of the report data. Table K defines the data format of an individual call report. Table L defines the format of a summary report. Several call and summary data blocks may be sent. The 41-3A awaits a response from the computer after each report. This response can be a reset CTRL Z command (ASCII code SUB) or one of the following:

R (i.e., repeat the last report data)

C (i.e., continue with next report data)

S (i.e., stop data transmission and exit transfer mode).

**TABLE J**

**DUMP REPORT HEADER**

| CHARACTER/DATA | DESCRIPTION |
|---|---|
| SOH | Start of header code |
| (ID code) | Code assigned via the ID code mode |
| LF | Segment <LF><CR> marks the end of this record block |
| CR | |

*Notes:*

1. Block-check characters are not included with the above transmission.
2. After the above block is sent, unformatted report data is transmitted. (These transmissions may comprise data from several stored call and summary reports).

**TABLE K**

**UNFORMATTED CALL REPORT DATA FORMAT**

| CHARACTER/DATA | DESCRIPTION |
|---|---|
| STX | Start of text indicator |
| E | Indicates the following data is from an individual call report |
| (dial mode) | ASCII digit 1 = MF, 2 = TT, and 4 = DP |
| (channel and line) | Indicates the channel and line on which the test call originated. The first byte designates Channel A or B (where 01H = A or 00H = B). The next byte designates the line (where 00H = line 1 and 07H = line 7). |
| (time and date) | Time and date of the report (as determined by the Model 41-3A's internal clock) |
| (digits dialed) | Gives the address digits/codes successfully dialed (up to 32 digits). |

**TABLE K (Cont)**

| CHARACTER/DATA | DESCRIPTION |
|---|---|
| (results flags) | Consists of seventeen 1-byte flags which correspond in order with the following disposition counts.<br><br>1. total tests (calls)<br>2. test OK's<br>3. tests on Channel A<br>4. tests on Channel B<br>5. no dial tone (no wink)<br>6. open C-lead<br>7. reversal during dialing<br>8. reorder (no answer)<br>9. reorder and answer<br>10. busy and answer<br>11. busy (no answer)<br>12. low level<br>13. no 1-kHz tone<br>14. high level<br>15. no answer<br>16. incoming circuit fault<br>17. no C-message tone<br><br>Each flag indicates when to increment its disposition category by:<br><br>00H = no change<br>01H = increase count by 1 |
| (1-kHz level) | Sent only if the low or high level test result flag is raised. It consists of a positive (+) or minus (-) sign and a 2-digit level value. |
| (C-message) | Sent only if the high-level test-result flag is raised. It is a 2-digit level value. |
| z<br>BCC1<br>BCC2<br>LF<br>CR | Sequence (z<BCC1><BCC2><LF><CR>) marks the end of the report. It is provided to facilitate error checking by the computer. All characters from STX to the final CR must be included in the computer's error-detection routine. |

*Notes:*

1. The Model 41-3A awaits and must receive a response from the computer after this report. The response can be an ASCII code SUB (reset), R (repeat), C (continue), or an S (stop).

2. Block-check characters are defined under subject heading Block-Check Generation (paragraph 3.85).

## TABLE L

## UNFORMATTED SUMMARY REPORT DATA FORMAT

| CHARACTER/DATA | DESCRIPTION |
|---|---|
| STX | Start of text indicator |
| S | Indicates a summary type report |
| (dial mode) | ASCII digit 1 = MF, 2 = TT, and 4 = DP |
| (time and date) | Time and date of the report (as determined by the Model 41-3A's internal clock) |
| (digits dialed) | Gives the address digits/codes successfully dialed (up to 32 digits). |
| (result totals) | Consists of seventeen 4-digit totals which correspond in order with the following disposition categories.<br><br>1. total test calls<br>2. test OK<br>3. tests on Channel A<br>4. tests on Channel B<br>5. no dial tone (no wink)<br>6. open C-lead<br>7. reversal during dialing<br>8. reorder (no answer)<br>9. reorder and answer<br>10. busy and answer<br>11. busy (no answer)<br>12. low level<br>13. no 1-kHz tone<br>14. high level<br>15. no answer<br>16. incoming circuit fault<br>17. no C-message tone<br><br>***Note:*** As an example, the 4-digit value sent for category 1 might be 0324, which indicates 324 total test calls were dialed to the designated address. |
| z<br>BCC1<br>BCC2<br>LF<br>CR | Sequence (z<BCC1><BCC2><LF><CR>) marks the end of the report. It is provided to facilitate error checking by the computer. All characters from STX to the final CR must be included in the computer's error detection routine. |

***Notes:***

1. The Model 41-3A awaits and must receive a response from the computer after this report. The response can be an ASCII code SUB (reset), R (repeat), C (continue), or an S (stop).

2. Block-check characters are defined under subject heading Block-Check Generation (paragraph 3.85).

### 3.85 Block-Check Generation

**3.86** The Model 41-3A provides a longitudinal parity check for error detection. Two block-check characters (designated BCC1 and BCC2) are calculated so that the exclusive OR of all characters in a transmitted block produces a result of 00H.

- BCC1 is defined by the expression BCC1 = [Accum + ] plus 70H * 40H + 70H, where [Accum + ] is the accumulated exclusive-OR of all transmitted characters except BCC1 and BCC2. Character BCC1 can only be an ASCII 0 (zero) or lowercase letter p.
- BCC2 = [Accum + ] + BCC1. It can be any character from zero (0) to the lowercase letter o.

***Note:*** The Model 41-3A sets all ASCII parity bits (bit 8) to zero when transmitting, and ignores this parity bit when receiving.

**3.87** The following procedure details the calculations used by the Model 41-3A to generate block-check characters. The host computer must provide block-check characters in the same manner when it loads the 41-3A with a call program.

(1) An exclusive-OR'ed result is determined for all characters to be transmitted, except BCC1 and BCC2 which will be calculated later. The program of Figure 38 is used below to demonstrate Step 1. Block elements are listed in two columns for ease of presentation. Also, repeated codes are indicated at the right of the binary code. The final result is 6EH.

**COLUMN A**

| ASCII CODE | HEX CODE | BINARY CODE | (REPEATS) |
|---|---|---|---|
| STX | 02 | 0000 0010 | |
| S | 53 | 0101 0011 | |
| 1 | 31 | 0011 0001 | |
| D | 44 | 0100 0100 | |
| 1 | 31 | 0011 0001 | |
| F | 46 | 0100 0110 | |
| 0 | 30 | 0011 0000 | |
| H | 48 | 0100 1000 | |
| 0 | 30 | 0011 0000 | (4) |
| T | 54 | 0101 0100 | |
| 0 | 30 | 0011 0000 | (4) |
| LF | 0A | 0000 1010 | |
| CR | 0D | 0000 1101 | |
| ETB | 17 | 0001 0111 | (15) |
| N | 4E | 0100 1110 | |

**COLUMN B**

| ASCII CODE | HEX CODE | BINARY CODE | (REPEATS) |
|---|---|---|---|
| 4 | 34 | 0011 0100 | |
| , | 2C | 0010 1100 | |
| 2 | 32 | 0011 0010 | (2) |
| 4 | 34 | 0011 0100 | |
| 6 | 36 | 0011 0110 | |
| 5 | 35 | 0011 0101 | |
| 1 | 31 | 0011 0001 | (2) |
| LF | 0A | 0000 1010 | |
| CR | 0D | 0000 1101 | |
| ETB | 17 | 0001 0111 | (40) } (101) |
| CR | 0D | 0000 1101 | (1) } |
| ETB | 17 | 0001 0111 | (13) |
| z | 7A | 0111 1010 | |
| LF | 0A | 0000 1010 | |
| CR | 0D | 0000 1101 | |
| | 6E | 0110 1110 | (Step 1 result) |

(2) Add 70H to the result of Step 1.

```
0110 1110  (Step 1 result)
0111 0000  (70H)
---------
1101 1110  (Step 2 result)
```

(3) AND the result of Step 2 with hexadecimal 40.

```
1101 1110  (Step 2 result)
0100 0000  (40H)
---------
0100 0000  (Step 3 result)
```

( 4 ) Exclusive-OR the result of Step 3 with hexadecimal 70.

```
0100 0000  (Step 3 result)
0111 0000  (70H)
-----------
0011 0000  (Step 4 result)
```

( 5 ) Set BCC1 equal to the result of Step 4 (i.e., BCC1 = 0011 0000). BCC1, for this example, is ASCII number zero (0).

( 6 ) Exclusive-OR the result of Step 1 with BCC1.

```
0110 1110  (Step 1 result)
0011 0000  (BCC1)
-----------
0101 1110  (Step 6 result)
```

( 7 ) Set BCC2 equal to the result of Step 6 (i.e., BCC2 = 0101 1110). BCC2, for this example, is ASCII code ^ (SHIFT N).

( 8 ) Both BCC1 and BCC2 are now defined. These characters are preceded by the lowercase letter z and followed by an LF and CR code. The Model 41-3A dumps the example program of Step 1 as shown below. Continue to Step 9.

```
<STX>S1D1F0H0000T0000<LF><CR>
<15 ETB codes>N4,2246511<LF><CR>
<40 ETB codes><CR>   }
      :              }
      :              } (101 times)
      :              }
<40 ETB codes><CR>   }
<13 ETB codes>z0^<LF><CR>
```

( 9 ) This is the end of the above step-by-step procedure for generating block-check characters. The computer must include all received characters from STX to the final CR in its longitudinal parity check. The exclusive-OR of these characters must produce a result of 00H. This result is demonstrated below for the example transmission of Step 8 by calculating the exclusive-OR of codes BCC1 and BCC2 with the result of Step 1.

```
0110 1110  (result from Step 1)
0011 0000  (BCC1 from Step 5)
0101 1110  (BCC2 from Step 7)
-----------
0000 0000  (NUL result 00H)
```

### 3.88 Load Program Format

**3.89** When a call program is loaded into the Model 41-3A, the program source may be a computer or tape drive.

**3.90** Table M defines the format required when a call program is loaded into the Model 41-3A via command 8 of the data transfer mode (i.e., Load program from host device into 41-3A.). As shown, a start of text (STX) indicator must precede the call program data, and a computer generated block-check segment must follow. The call program format is similar to the format of Table I, except that LF's are not required, and consecutive ETB's are not affixed with a CR.

> ***Note:*** Although the Model 41-3A transmits data over the full range of baud rates given in Figure 2, the 41-3A is restricted to a maximum of 100 characters per second (i.e., a baud rate of 1200) when receiving continuous data.

## TABLE M

## LOAD PROGRAM FORMAT

| CHARACTER/DATA | DESCRIPTION |
|---|---|
| STX | Start of text indicator |
| program data | Program stored in the host computer. It must consist of 4,096 call program characters (this includes CR delineators and ETB fillers). As an example, a program could consist of the following characters.<br><br>S1D1F0H0000T0000<CR><br><15 ETB codes>N4,2246511<CR><br><4053 ETB codes> |
| z<br>BCC1<br>BCC2<br>LF<br>CR | Marks the end of the transmitted data block. Characters BCC1 and BCC2 must be calculated as defined under subject heading Block-Check Generation (paragraph 3.85). For the above example program BCC1 = 0 (zero) and BCC2 = S. |

*Notes:*

1. All received characters from STX to the final CR are included in the Model 41-3A's block-check routine. If the 41-3A block-check fails, it transmits the message ERROR MODE CONDITION.
2. When loaded, the example call program used above is stored in the 41-3A as shown in Figure 38.
3. After execution of a load program command, the 41-3A transmits an exit and system ready message, then awaits a command from the computer.

**3.91** Once a program is loaded into the Model 41-3A, he data transfer mode permits this program to be stored on tape for later retrieval. Commands 1 and 7 of the data transfer mode, and commands 1 and 4 of the operate mode are all available for these operations.

> ***Note:*** When transferring a program to tape, only a new or unused tape cassette should be used to prevent the loss of a previously taped program. Prior to data transmission, the Model 41-3A performs a format procedure which first rewinds the tape and then establishes a load point marker. Only one call program is stored per tape side.

**3.92** Instead of the Model 41-3A's data transfer mode, the user may choose to record a call program on tape by a means not involving the 41-3A unit. If such a method is used, the taped recording must contain a proper load procedure for the Model 41-3A. Table N defines the recording procedure and tape data required. The first column of the table lists the ASCII command codes which control the tape drive (MFE Model 2500). The second column defines the data codes which must be stored on tape during a start-to-stop record (DC2 to DC4) sequence. When a code (such as an ETB or digit 2 code) must be stored as a string of repeated characters, the number of times the code is used is shown in parentheses next to the code. Notice that the last record sequence, in which a string of 30 ETB's is stored, must be repeated 12 times for a total data storage of 360 ETB's. The last command codes (ESC and SYN) cause the tape drive to erase the remainder of the tape.

> ***Note:*** The use of a tape drive other than an MFE Model 2500 tape drive is not recommended by Northeast Electronics.

**3.93** Prior to recording a tape, set the front panel switches of the Model 2500 as follows:

(1) Set all toggle switches to off (down position).

(2) Push the REWIND (momentary toggle) switch to on.

(3) Set the ON LINE switch to on (up position).

**3.94** The data format of Table N allows a recorded program to be retrieved by the Model 41-3A via operate or data transfer mode commands from the computer, or to be loaded into the 41-3A by use of the tape drive's front panel controls. If the tape record is loaded by a mode command from the computer (or terminal keyboard entry), the Model 41-3A skips the first three record blocks of the tape. (The 41-3A transmits three F code messages to indicate these skips.) If tape drive panel controls are used, the taped SI code places the 41-3A in its operate mode, and a detected digit 2 code causes the 41-3A to execute a "Run program from tape" function.

*Note:* The Model 41-3A must be in its system ready mode if the tape drive's front panel controls are used to directly load and operate the 41-3A.

**3.95** If loaded into the Model 41-3A, the example call program used in Table N is stored in the 41-3A buffer as shown in Figure 38. Only data codes beginning with STX and ending with the final CR are included in the Model 41-3A's error check. If the tape drive's front panel switches are used to load a recorded program and a repeated transmission error occurs, disconnect the tape drive.

**TABLE N**

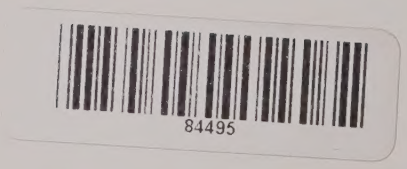
**RECORD FORMAT**

| TAPE DRIVE COMMAND CODE | TAPE DATA CODES | DATA CODE FUNCTION |
|---|---|---|
| DC2 | SI | SI is a keyboard CTRL O command; i.e., it sets the Model 41-3A in its operate mode. |
| | ETB (60) | (CTRL W) filler characters which allow time for the 41-3A to perform certain operate mode software routines. |
| DC4 | | |
| DC2 | ETB (60) | Same function as above. |
| DC4 | | |
| DC2 | ETB (30) | Same function as above. |
| | 2 (11) | Causes Model 41-3A to execute command 2 of its operate mode (i.e., Run program from tape). Eleven digits are used to ensure the reception of a digit 2 by the 41-3A. |
| | LF<br>CR | |
| DC4 | | |
| DC2 | (ID code) | ID data is the tape's program name (up to 32 characters). |
| | LF<br>CR | |
| | DC3 | An M2500 stop send command used by the 41-3A load routine. |
| DC4 | | |

**TABLE N (Cont)**

| TAPE DRIVE COMMAND CODE | TAPE DATA CODES | DATA CODE FUNCTION |
|---|---|---|
| DC2 | STX<br>(program) | Start of text indicator for program data.<br>This is the call program which the Model retrieves from tape when it executes command 2 of its operate mode. This program data consists of 4,096 characters. As an example, the data might consist of the following record strings. (Notice that this program data is formatted in the same manner as is shown in Table M.)<br><br>S1D1F0H0000T0000<CR><br><15 ETB codes>N4,2246511<CR><br><4053 ETB codes> |
| | z<br>BCC1<br>BCC2<br>LF | Must append the program data. Characters BCC1 and BCC2 must be calculated as defined in paragraph 3.85, under subject heading Block-Check Generation. For the above example program, BCC1 = 0 (zero) and BCC2 = S. |
| DC4 | CR | |
| DC2 | ETB (30) | Sequence must be repeated 12 times (i.e., a total of 360 ETB codes must be stored on tape). |
| DC4 | | |
| ESC<br>SYN | | |

*Note:* If the above taped program is loaded into the Model 41-3A, only the data codes beginning with STX and ending with the final CR are included in the Model 41-3A's error check.

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